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ORIGINAL ARTICLES

IMPORTANT CONSIDERATIONS IN RETENTION*

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THE term "retention" is usually applied to that phase of orthodontic treatment which follows upon the restoration of maloccluding teeth and arches to their normal relations. Until very recently, any consideration of this period was concerned chiefly with mechanical appliances, more or less fixed in character, whose purpose was to support the teeth in their new relationship until such a time as it could be deemed safe to release them from mechanical restraint.

That such a viewpoint of "so-called retention" fell far short of complying with the real needs of this period is now admitted quite universally. With the recognition of the fact that the teeth and dental arches are not fixed units after treatment but like any other assemblage of structure are subject to modification and change during growth and development, and with the realization that such changes continue until the structures involved have become harmonized in function with other adjacent structures, the period of retention appears to us in a new light.

In looking at the question from this viewpoint, we should realize first of all that the length of time required to gain this end must of necessity vary greatly in different cases, for it would be dependent upon the correlation of several important factors. In directing your attention to these, it might be well to first consider briefly the relationship of the active period of treatment to retention and the demands which must be complied with to favor successful results. As our problem is one of development, it would

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seem logical to have the active period of treatment restore the dental arches and teeth to that form, relationship, and condition *which will be normal for the child for the particular age at which the work is accomplished.* This is an important point and one to which we should give careful consideration, for many cases are doubtless undertreated and perhaps an equal number are overtreated, either of which condition is undesirable. On the other hand, if the requirements of treatment are properly met as before specified, and the other factors which favor the adaptation, growth and development of the parts are allowed normal operation, there should be no uncertainty of results.

The tendency of tissues and organs to grow and develop until the needs of function are satisfied is inherent with all tissues and where the period of active treatment has been properly carried out, this tendency is stimulated rather than retarded. In the growing child, this tendency receives constant stimulus from the development and eruption of the teeth and when this process is complete, their use in mastication supplies an additional and ever-constant impetus.

Of equal importance to the factors so far named is the muscular influence to which the arches and jaws are subjected, for these constitute the environment which must modify or condition to a large extent the other growth forces. This fact is now generally appreciated by orthodontists of experience but unfortunately many beginners in our specialty, as well as numerous dentists attempting orthodontic operations, seem prone to ignore the fact or attach but slight significance to it. Frequently much time is given to the study of the anatomy and physiology of the oral cavity and its equipment, but in such studies, the deeper structures such as the maxillary bones and the teeth seem to receive the greatest consideration while the superficial structures are more or less ignored. The gravity of this error will be apparent to those who stop to consider the fact that the teeth and dental arches lie within the range of activity which is practically limited by muscles both from within and from without.

The action of this compact arrangement of muscles when normal tends to hold the teeth and arches in their normal relations, and at the same time, the teeth when in their normal occlusion, offer the proper framework over which the muscles may properly function. The reverse is equally true and where muscles are not used normally and where they do not function harmoniously, they will invariably exert stresses which if continued will produce malformations of the osseous structures to which they are attached and over which they function.

By the time our patients enter upon the period of retention, they have usually revealed to us their muscular deficiencies and if we have not been remiss in our duties, we have endeavored to correct them. However, if such weaknesses are still apparent at the time the active period of treatment is concluded, we should reemphasize the importance of this factor to the patient and also to the parents or guardian.

While they have not been specifically mentioned, abnormal muscular habits such as lip biting, tongue biting, etc., cannot do otherwise than militate against successful results and in many instances may mean complete failure. Where such habits exist the only hope lies with the patient, for the habit must be discontinued and discontinued permanently. It is highly important that such habits be discovered and their injurious effects made known as early as possible in our association with the patient for if allowed to go on until the case is nearing completion, such information will frequently be interpreted as an attempt on the part of the orthodontist to establish a possible alibi in case of failure.

In addition to the factors thus far mentioned, we have still another which must be considered in some cases, namely, metabolism. Important as is function in the rôle of growth and devlopment, it cannot work single-handed and if general metabolism is below par, satisfactory results will frequently not be obtained. The fact that malnutrition or some other systemic deficiency is frequently present in children undergoing orthodontic treatment and is overlooked by both parents and orthodontist, is undoubtedly responsible for many partial successes and some failures. It is hardly reasonable to expect the supporting structures of the teeth to respond to the action of appliances to the degree necessary for the best results unless their vitality is such as to respond readily to such stimuli. Therefore, when children exhibit the unmistakable evidence of malnutrition or other deficiencies, the attention of parents should be called to the fact that normal metabolism is essential to successful orthodontic treatment and they should be urged to seek the services of a competent pediatrician so that steps may immediately be initiated toward overcoming such obstacles.

Thus far, we have considered those factors in retention which might be termed physiological in character and have not touched upon the mechanical agencies which must be used while the changes brought about through treatment are becoming correlated to the general plan of growth, development and function. The appliances used for this purpose must be designed to meet individual requirements which are governed by the character of the changes which have been brought about, but regardless of what these changes may have been, such appliances should all conform in one principle as far as possible, that is, they should allow freedom of movement to the teeth under occlusal stress and antagonize them only in the direction of their tendencies to move back into their former relationship.

Retaining appliances may be divided into two distinct types which we may call fixed appliances and removable appliances. In the first type, we would include those made up of bands used singly or in groups connected together lingually or labially by bars of wire, lingual arches, etc., and cemented upon the teeth. Unquestionably, this type has a wide field of usefulness among our very young patients who have mixed dentures, or among those who cannot be depended upon to give the degree of cooperation necessary to use a removable appliance. In their design and construction, an effort should always be made to avoid rigidity, if possible, for teeth subjected to such

treatment are naturally deprived of normal occlusal function and for that reason the tissues adjacent to them are denied the stimulus which might prevail under natural conditions.

Whatever the character of the retaining appliance, the orthodontist should keep ever in mind the health of the soft tissues surrounding the teeth and should safeguard them by adapting the mechanism in such a way that the liability to food accumulations or other irritations to the soft tissues may be reduced to the minimum.

Where it is necessary to use labial arch wires in any form during this period, or where hooks or other projections from bands occupy a labial or buccal relationship to the teeth, great care should be exercised because of the effect they may have upon the labial and buccal muscles. Because of the intimate relationship which these structures bear to the appliances and in consideration of the fact that normal habits of these muscles must be encouraged at all times, it is of the most vital importance that they not be irritated or thickened through contact with poorly adapted appliances for this in turn may easily become an initial factor in perverting their action or in developing abnormal muscular habits.

The mechanical problems of retention frequently require not only the maintenance of individual teeth in definite positions, but also the maintenance of arch form and arch relationship. If we analyze our cases thoroughly, we cannot but realize that these three conditions must be met in the vast majority of instances. We have available several types of appliances which will accomplish this three-fold purpose, but I wish to direct your attention at this time to a removable appliance which is proving highly successful in my hands. I refer to the Hawley retainer. It is needless to give a detailed description of this mechanism except to say that it is usually composed of a skeleton vulcanite plate which is accurately adapted to the lingual surfaces of the teeth and carries a labial extension, the supports of which are imbedded in the vulcanite and pass to the buccal between the canine and the first premolar teeth. A clasp is attached to the labial extension just distal to the canine and is brought into contact with the first premolar at the gingival margin thereby aiding the retention of the appliance.

This retaining appliance may be modified in several ways, for it may be used with bands upon two or more teeth with locking devices to engage the clasps and thereby aid in its retention; it may be used with labial wires or without them, when used as an upper retainer; it may carry a bite plane upon its lingual surface to control incisal over-lap, and the material of which it is constructed need not of necessity be of vulcanite as the main portion may be cast in gold or other metal if desired.

Not infrequently, men advocate the use of some special mechanism without subjecting it to a sufficient number of tests to demonstrate its value, and this fact often deters conservative men from trying the method advocated. Having this thought in mind, I am going to give you some interesting data upon my experience with the Hawley retainer. Up to the present time, I have had 146 patients using these retainers. In 88 cases, they have

been utilized upon the maxillary teeth only; in 6 cases they have been used on the mandibular teeth only; and in 52 cases, they have been used on both the maxillary and mandibular teeth. Of the total number, 63 cases belonged to Class I, 40 cases belonged to Class II, Division 1; 39 cases belonged to Class II, Division 2; and four cases belonged to Class III. A glance at these figures will reveal the fact that in my laboratory, 198 retaining appliances have been constructed for 146 separate patients not counting duplicates made necessary through loss. In this connection, let me state that during the past two years five appliances have been lost by patients. In three of these instances, the patients were traveling at the time of the loss, and in the other two, spring house-cleaning was the cause. In two instances, breakage has occurred, but this was easily remedied. Three cases out of a total of 146 failed to give the degree of cooperation necessary for good results and other forms of appliances were resorted to.

In certain quarters, this appliance has been criticized, the claim being made that it was illogical because its use depended upon the patient's cooperation. It is true that we must use a certain amount of discrimination in the selection of patients whose teeth are to be retained by this method but an orthodontist is supposed to have intelligence enough to do this.

Another criticism which has been made is that a patient will not wear such an appliance all the time but will frequently leave it out. This is very true, but it is not a serious objection in that it is usually only necessary to wear such appliances at night and most intelligent children will gladly cooperate in this plan because it means that at other times their teeth can be free from appliances.

In considering the question of whether or not the wearing of retaining appliances at night only is logical and conducive to good results, let me state that my experience so far makes me feel that it is. In making such a statement, however, I do so with the understanding that this method would not be attempted except in those cases where the patient's cooperation can be depended upon. The advantage of having the teeth and adjacent soft tissues released from any restraint or irritating influences will soon become apparent to any one who intelligently tries out this plan.

Conclusions.—The period of retention is an important phase of orthodontic treatment during which the success or failure of the case is determined.

During retention, the teeth and dental arches do not remain as fixed units but are subject to the modifications and changes which accompany growth and development and their adaptation in function with other adjacent structures.

If this process is to be favored, the active period of treatment must have accomplished the restoration of the dental arches and teeth to that form, relationship and condition which is normal for the child at the particular age at which the work is carried out.

The tendency of tissues and organs to grow and develop until the needs of function are satisfied is inherent with the teeth and jaws as with all other

tissues and should be encouraged and stimulated through the functional activity of the teeth, normal action of the muscular environment of the teeth and dental arches, and normal systemic balance and metabolism.

Retaining appliances should be used until such a time as the changes brought about through treatment have become correlated to, and harmonized with the general plan of growth, development and function.

Such appliances whether they be fixed or removable in character should allow freedom of movement to the teeth under occlusal stress and antagonize them only in the direction of their tendencies to move back into their former relationships.

Where applicable, a removable appliance offers advantages which make it preferable to the fixed type.

DISCUSSION

Dr. A. A. Suggett.—I want to thank Dr. McCoy very much for this excellent paper. There is quite a lot in it for thought and study. Retention has been a perplexing problem to most of us, or to all of us, ever since we started in this work. One orthodontist said he would be willing to divide his fee equally with some other man who would assume the responsibility and take up the cases after he had placed the teeth in proper occlusion. That means that the problem of retention as he viewed it, was a serious thing. Unless we know more of the etiology of malocclusion we will have trouble in retaining our cases. If we completely comprehended the causes of malocclusion we would still have trouble. But until we know more of the causative factors retention will be a very difficult thing.

In distoclusion cases, particularly those characterized by protrusion of the anterior teeth, where the patient breathes through the mouth, I believe retention is almost impossible unless this habit is broken up and normal breathing is secured. Otherwise, even if you hold the teeth for twenty-five years, there will be a tendency to revert to the old positions.

Another thing in connection with the retention of cases is the so-called subject of normal occlusion. According to Angle's concept, normal occlusion is what we are striving for. According to LeRoy Johnson and his followers what we strive for is the "Individual Normal." You have your choice as to which you wish to accomplish, but the "individual normal" is only a working hypothesis, and whichever one you accept, if you are conscientious, your result is the same. Perhaps we are sometimes trying to establish something that cannot be worked out. For that reason Nature tends to revert to the condition that Dr. LeRoy Johnson calls the "individual normal." In any case retention is difficult and will be so until we completely understand and comprehend the cause of the malocclusion.

Dr. F. Wolfsohn, San Francisco.—I have had the opportunity lately to visit some of the men in the East who are striving along certain lines, and it was interesting to note in Dr. Mershon's office his method in the retention of cases. During the fall, winter, and spring months progress is carefully noted, and during the summer months bands and all appliances are removed from the mouth. He told me that during the last ten years there have not been two appliances made in his office for purposes of retention.

Looking back again to another office, that of Dr. Rogers of Boston, cases are handled a little differently. The cases are treated and Hawley removable appliances are used mainly as a working basis for exercises. Certain teeth in many cases are banded and retaining appliances (individual appliances) are used.

I have been told that Dr. LeRoy Johnson uses no retaining appliances, and so it is a matter of seeing how the men we look to as leaders in the profession cope with this problem of retention that we are to enlarge our vision. I cannot reach conclusions from any vast experience as I have only a few cases under retention as yet, but I am trying to see what other men are doing and hope to benefit by their successes or failures.

Dr. John R. McCoy.—I have always felt the importance of the period of retention or "secondary treatment" as we term it. I think the most of us have felt its importance, as that is the time we begin to note our apparent failures. I have been very much pleased in the last year and a half, since I have commenced to use the removable Hawley retainers, with their practical value. In our hands they have certainly proved a boon. It is pretty difficult to convince any of you of their great value until you have used them yourselves. After using them in a great many cases, we can certainly recommend their use.

Dr. W. J. Bell, Los Angeles.—I have used a great number of the Hawley retainers and have had wonderful results. But my honest conviction is that of the much-discussed problem of the mechanics of orthodontics it will be the retainer that will be the first to be discarded and eventually there will be no retainers used. We will discover where the fault lies and will so correct the malocclusion that retainers will not be necessary. Today, however, I know of nothing better than the Hawley retainer.

Dr. B. Frank Gray, San Francisco.—Certainly our conception of "retention" in orthodontia has changed considerably in the past few years. Dr. McCoy has made a very helpful contribution to our study of the subject, clearly setting forth many of the considerations we need to have in mind in our daily practice. It is high time indeed that we note the influence of deficient nutrition on the orthodontic problem.

Muscular exercises doubtless will help us—where the regime can be enforced, but I shall predict that the omission of all retaining appliances will not become common practice for a long time. We are too prone to feel we can jump from the limitations that have been borne in upon us all by our own experience and that of our pioneers in orthodontia, into that ideal realization that neither regulating appliances nor retaining appliances are to be necessary. Let us mark this date and those of us who are in practice twenty-five years from now may find interest in noting how far toward the goal we will have come.

The Hawley retainer is proving a wonderful satisfaction in my practice. I know of nothing that has proved of so much aid among the various methods that have been resorted to.

Dr. Robert Dunn, San Francisco, Calif.—I recall the experiences of our earlier days in practice and the only difference in the Hawley retainers used today and the devices used at that time is that of the attachments to hold them more securely in place. Some of you may recall what was known as the Baker plate: Hawley uses the same idea improved with attachment. I have for a long time used the mandibular retaining plate with little wire projections to engage the lingual groove of the molars to hold the plate from dropping at its distal portion. Unless you construct your Hawley retainers so that they will remain securely in position, resisting forces that tend to move them up and down, they will prove an absolute failure.

Never in my years of practice, with the exception possibly of the first few years, have I used a rigid retainer, because I do not care how successful or skillful the man may be, he cannot use any mechanical contrivance for correcting irregularities of the teeth without having some displacement of his anchorage, sufficiently anyway to interfere with occlusion and unless you use a retaining appliance that allows of a certain amount of individual tooth adjustment, the case will not be a success.

You will never get away from the necessity for retention so long as you are treating irregularities of the teeth: It makes little difference whether you call a part of your conduct of the case one thing and another part something else for you must change your appliances from time to time to care for development otherwise you are not progressive. I do not believe that with one appliance used throughout treatment one can get the results one can and should.

There is but one place in my experience where you can possibly use a rigid retainer and that is from mandibular canine to mandibular canine. And why? I regret there is apparently so little attention paid to arrested vertical development and when you gentlemen begin to appreciate and see it, your problems of retention will be greatly diminished.

It is in cases where such conditions are present that the rigid retainer in mandibular canine and incisor region is often indicated and proves successful.

Dr. Reed, Long Beach, Calif.—While my experience in their use is limited, I have used a number of the Hawley retainers and I want to thank Dr. McCoy for his report on an extensive use of these appliances. Dr. Dunn mentioned the necessity of constructing the retainers so that they would remain in their position as nearly as possible. I have found some trouble in the use of the maxillary Hawley retainer, especially as it is usually designed, in those cases where lateral development has been secured. In the attempt to hold the appliance to its position by the use of spring clasps against the first premolars, I have found a tendency to narrow the arch. Of course the vulcanite is supposed to keep its position and not drop occlusally, but very frequently in my hands it has slipped a little. To avoid this I have used, in a number of cases, bands on the first premolars, placing a lug near the gingivae on the lingual aspect of the tooth, and then cutting away the vulcanite from the premolar teeth and carrying the 19 gauge wire from the molar region along the gingivo-lingual surfaces of these premolars and going gingivally to this lug. This holds the retainer firmly to place and not only that but it tends to resist the tendency of the premolars to spring lingually to their former positions. If there is any tendency to do that you can put a little spring tension on this wire and in that way in fact widen the arch.

There is also, as Dr. Dunn has said, the vertical development problem, and by carrying this spring occlusally we can maintain the vertical development of the premolar region and hold the plate in place at the same time. I have found many cases of Class II in which this lack of vertical development is in evidence.

Dr. Robert Dunn.—Dr. Reed speaks of the difficulty with the premolars. I meant to state when referring to the Hawley retainer, that this is its weak point. It interferes somewhat where the premolars are clasped unless you are very particular in the adjustments and this is in a region that is extremely important. To overcome any possible interference in this region, I would suggest that in addition to the labial wire engaging the incisors that you band your molars with a lug on the lingual surfaces of the latter to engage the plate, leaving the premolars free. Thus you get a retention for the plate that is very satisfactory. There is enough "give" in the plate so that it will spring into place and the molars will still be allowed to take any necessary position for the proper relation of their inclined planes.

Dr. Suggett.—It is rather interesting to see how the profession as a whole seems to be keeping step in this advancement. I think, as Dr. Bell said, we are all tending toward the elimination of retention, and we are now going through the different steps leading up to it. The Hawley plate as described by Dr. McCoy, has a very large place in retention I think. There is one point he did not cover, i.e., the plate is resorted to occasionally before the patient is ready for it. My tendency has been for a number of years to eliminate the retention, and keep on with the appliances we have used in the first instance to correct the case. In distal cases we use the lingual removable arch wire in the mandibular, in conjunction with intermaxillary ligatures very often. It requires but a short period in the use of the intermaxillary ligatures. We have gradually left off the use of these, however, requiring the patient at first to wear them every night, then but a night or two each week, then leaving them off entirely. Often we have used the high labial arch with fingers coming down and resting on the incisal edges of the centrals and laterals. Then gradually, after eliminating the maxillary arch entirely, we would leave the mandibular arch on for some considerable length of time, removing it later on. I think this plan has been more successful in my hands than any other form of retention.

I was about to say that I would first eliminate the use of rigid retention from canine to canine in the mandibular arch. My reason for that was that some years ago I finally tapered off to this retention, and in a number of instances after watching the cases for a year or more and being satisfied they were right, later I would find a narrowing in the

bicuspid region, and the cuspids of course remained at their full width. Naturally this was not a success. So instead of using the rigid appliance, I would keep on with the mandibular lingual wire, which would have a tendency to rest on the lingual inclined planes of the canines and laterals, thus holding them down. There is a lack of rigidity and it is more satisfactory than anything we have ever tried.

Another thing I was going to comment on, i.e., the use of the bite plane. In the use of this, with the Hawley plate, with a lack of vertical development, we would have a considerable amount of stress on the anterior mandibular teeth, keeping them depressed and holding them forward, and I have found that creates a stimulation and that after the plate is removed there is the tendency for these teeth to very quickly go back to the overlapped condition of the incisors that existed in the beginning. It is the result of this stimulation to the incisors. I have therefore resorted to a bite plane. I think Rogers first made it in that form, fitting the bands to the centrals. Solder a piece of nickel rolled to about 25 gauge, using 16k solder, and having this bite plane for the two centrals, always using it in conjunction with the intermaxillary anchorage. That will also create the same stimulation that the Hawley plate does in the anterior region. After this condition has been reduced and the buccal teeth have been elongated and come up to the new plane, then remove the bite plane from the centrals and go ahead with the Baker anchorage and hold them against the mandibular teeth pretty firmly but gradually let up on that pressure. Unless we do that I think we create a stimulation there as explained.

So there were two things I felt pretty sure of, and Dr. Dunn has raised a doubt in my mind as to one, and the other may meet the same fate! I refer to the rigidity of retention of the mandibular canines and the bite plane feature of the Hawley plate used without the Baker anchorage.

Dr. Robert Dunn.—I fear perhaps I have been misunderstood about rigid retention. I did not mean to indicate that it was always necessary or proper. I merely meant to convey the idea that there is one place where rigid retention could be used and prove successful: that it proved a failure in Dr. Suggett's case I think was due to the fact that he did not get sufficient vertical development established in his premolar region which is so necessary. It holds the canines where they were wanted and intended. The rigid retention for the canine region is to be maintained until we have established the vertical development of the molar and premolar region. It helps to sustain a very important part of the arch, i.e., from canine to canine. The Hawley plate will not retain the mandibular canine region as satisfactorily as you really think it will because of the action of the muscles of the tongue, particularly in some children who like to play with the appliance with the tongue, and you cannot stop this habit. This is one place where the canine to canine rigid retainer is applicable.

I would like to go on record here for one thing since Dr. Suggett has referred to it: I do not care how much depression you bring about in your mandibular incisors, they will resume the original position almost invariably and the condition he speaks of is accounted for from this fact coupled with the likelihood of sufficient vertical development in the molar and premolar region being obtained.

Dr. James D. McCoy.—I fear we have wandered a bit from the subject. Of course, that can be pardoned on the ground that we are all hungry for all the information we can get along these lines, although we must admit that retaining appliances or any consideration of the mechanical phases of retention only constitute one part of the problem.

There is one thing which has been brought out which I should like to emphasize, and I did emphasize it time and again in the paper, i. e., retention is an important phase of orthodontic treatment. I believe that one of the most damaging things that has occurred in orthodontia in recent years has been the impression given to patients from certain quarters that orthodontic treatment is complete when the teeth are moved into their correct occlusal relations. Most of you here have had experience enough to know that *that is only one stage of the treatment.* Those of us privileged to live in the Southern portion of the State have had this brought to mind repeatedly during the last few years through the propaganda handed out by those interests favoring a certain type of patented

appliance. These susceptible young men have been taught that rapid treatment is one of the chief objects to be gained in orthodontia, and are letting the impression go broadcast that cases should be completed in from three to six months. You all know that we can in a majority of cases move teeth into good occlusal relationship in a very short time, the time required depending a good deal upon the age of the patient, and the problem the particular case involves; but *it is certainly most misleading and ridiculous for them to lead the public to believe that cases are completed simply because the teeth have been placed in their normal relations.* They say their cases are completed in from three to six months, but after they have the teeth in a correct relationship, they insert in the patient's mouth a crude imitation of the Hawley retainer and let the patient wear it "until the cows come home." It sometimes takes a good many years for the cows to come home, but strange as it may seem to fair-minded men, this additional period of appliance wearing is not listed as "treatment." What we have always designated as retention is in reality an important phase of orthodontic treatment.

Dr. Suggett said we had to choose between one of two things, establish ideal occlusion or such a relation of the teeth as Johnson has spoken of as "the individual normal." Yesterday, Dr. Gray told me he believed that if we established the teeth in what we term normal occlusion, they would of themselves through the influence of the general environment of the mouth ultimately conform to what might be termed "the individual normal." I think he has stated the solution of the problem very aptly indeed. I told him at the time that his statement brought to mind one of my early experiences with the Hawley retainer. It seems I had under treatment a bad case of Class II Division I. I established the teeth where I wanted them, and then placed Hawley retainers on both the maxillary and mandibular teeth using them at night only, and continued this treatment for a year's time. At the end of that time, I was so well pleased with the condition of the teeth and arches that I removed the appliances and instructed the patient to come to my office again in a month. At that visit, I observed the teeth and noted that everything was in beautiful condition and apparently as I had left them when the appliances were discarded. Upon attempting to place the discarded appliance back upon the teeth, I found they would not go to place, or even approach a reasonable fit. What had happened? The "individual normal" had become established there, and yet to look at those teeth and judge their arrangement and relationship, no change was visible to the eye. That started me to thinking and I tried it out with other cases, and have failed to find a single case where, after one or two months' time, the appliances would fit absolutely, and yet the teeth to all appearances were in normal relation, and had remained as they were before the influence of the appliance was taken away. The teeth had simply adapted themselves to the jaws in such manner as to be in harmony with all the various forces to which they are subjected.

Going back to the Hawley retainer, I want to emphasize a point made by Dr. Robert Dunn, namely, the officiency of this retainer demands that it be seated against the soft tissues. This can always be accomplished if you use good judgment in the type of attachment you use to hold it in the mouth. If you have a bell-shaped premolar the clasp coming down from the loop opposite the canine and fitting over the bell near the gingival margin will hold it. If the tooth is short and has straight "up and down" sides, you must band it and use a little latch, or utilize some other means of anchoring the appliance in the mouth.

The last thought I want to leave with you is this. Retention is an important phase of orthodontic treatment. In our office, we endeavor to impress this fact upon patients and also upon their parents, for we find that where this can be accomplished, a more helpful degree of cooperation is given. Having this idea in mind, my brother and I prepared a letter which we send to the parent of every child as soon as the teeth have been brought to the point where retaining appliances are to be utilized. You can tell a person a thing and he will forget it regardless of how strongly you emphasize it, but if you send him a letter and keep a copy, in case of later controversy, you have something to fall back on. The letter follows:

"My dear Mrs. ————:

"You will doubtless recall my previous explanation of the fact that orthodontic treatment is divided into two periods, the first of which is concerned with the establishment of the teeth and dental arches in their normal relationship. This, the primary treatment as we term it, has now been completed for your ——— and we are now entering upon the secondary treatment or that period during which the teeth must be retained in their normal positions and relations until the investing tissues and muscular forces can achieve that degree of balance and development which will make possible permanent results.

"During the period of secondary treatment it will not be necessary for ——— to come to the office frequently but it is absolutely essential that ——— carry out my instructions and any failure on ——— part to do so will relieve me of the responsibility of any ill results which may follow. Lest there be any misunderstanding as to the nature of the instructions given, I am writing you some of the most important ones in the hope that your cooperation will be enlisted.

"In the first place, I must inspect ———'s teeth and appliances once a month to begin with, such inspections to be made by appointment. Later on, the periods of inspection may be extended to six weeks or two months provided conditions are satisfactory in the mouth and all appliances remain in good order. If you are not present at each appointment, please ascertain from ——— the character of any new instructions given so you may see that they are carried out.

"Where removable retaining appliances have been supplied as in your ———'s case, they must be consistently worn *every night*. Laxity in following out this instruction will invariably bring about unsatisfactory results and necessitate the construction of new appliances which of course means added expense to you and additional worry to me. At the time of inspection, all removable appliances must be brought to the office so that they may be checked as to accuracy.

"Where any retaining appliances of the nonremovable type are being employed, the patient must avoid the use of sticky candy which will almost always dislodge the bands cemented to the teeth or otherwise interfere with the adjustment of the mechanism. As such appliances are usually made secure to the teeth through the medium of cemented bands, any looseness of such bands must be reported immediately regardless of when they occur. I always stand ready to make the necessary repairs or adjustments and only require that I be notified so that a suitable appointment may be made.

"I have endeavored to impress upon ——— the importance of giving ——— teeth regular care so far as cleansing is concerned, suggesting the use of the tooth brush in conjunction with a good dentifrice at least twice a day, preferably after breakfast and before retiring.

"Another important consideration in successful orthodontic treatment is concerned with the normal functioning of the muscular structures in and about the mouth. Of paramount importance in this connection is the normal use of the muscle comprising the lips as well as those muscular groups related to it. Too much stress cannot be laid upon this point for normally developed and normally used muscles are absolutely essential to the maintenance of the teeth in their correct relationship. Where the natural function of these structures is interfered with or perverted through habitual mouth breathing, or through such nervous habits as lip biting, tongue biting or other frequently repeated abnormal muscular stresses, the teeth will almost invariably be forced back into positions of malocclusion. If the misuse of these structures is due to habit, the patient must discontinue the habit and failure on ——— part to do so will relieve me from the responsibility of any ill results which may accrue.

"The period of time through which retaining appliances must be worn varies greatly in different cases, ranging from a few weeks to a year or longer. No set rule governing this period may be made. It is safe to assume however that such mechanical support is essential until we have reason to feel that the recently moved teeth and modified arches have become harmonized in function with all the forces to which they are subject. When in our judgment, this point has been reached, the appliances may be removed. When this

is done, a case should still be kept under observation so that if unfavorable changes become apparent, the appliances can be replaced and worn until conditions warrant their removal.

"As a fixed yearly charge is made for the observation and care of our cases during the period of secondary treatment, as previously explained to you, let me urge you to take advantage of the safeguards it offers and have ——— come to my office at regular intervals.

"Trusting I have made myself clear on all the matters referred to above or if I have not, assuring you of my willingness to add further and fuller explanations if you desire them, I am,

Very truly yours,"

PRESIDENT'S ADDRESS*

By Oren A. Oliver, D.D.S., Nashville, Tenn.

PERMIT me at this time to express to you, the members of the Southern Society of Orthodontists, my deep appreciation of the honor that you have conferred upon me in selecting me to preside over your society. I shall always esteem the presidency of our society, composed as it is of the leaders of the orthodontic science, one of the greatest honors that can be bestowed upon me.

It affords me genuine pleasure to greet the members and guests of this society. With the most of you it is like meeting old and close personal friends whose aims and interests are common with my own, and the grasp of whose hands stirs pleasant memories. I feel that this society is much like one big family whose individual members are all laboring for a common purpose and all working together toward a definite aim.

These meetings are of great value to us as orthodontists. As we meet annually to interchange ideas and to discuss freely and generously the many problems that confront us in our daily practice, the value cannot be estimated. It must, therefore, be recognized as a serious mistake for a member to allow anything to interfere with his attending the annual meeting. At the time of this, our fourth annual meeting, our membership is larger than ever before and I believe you will agree at the close of this session that our program will compare favorably with any similar program which it has been your privilege to hear.

I trust that each of you will listen with earnestness and that you will be frank in your discussion, whether congratulatory or otherwise. "When men smile and agree, progress weeps" is the assertion of an eminent surgeon in one of his writings, but when men disagree and still smile as they do in our society there is every reason why progress should applaud.

Orthodontia, new as it is as a specialty, has made more rapid progress than nearly any other branch of dentistry, but it must be remembered that all real progress is made at a snail-like pace. Now and then a new idea bursts forth and threatens to revolutionize our methods of practice, but these, after creating a short flurry of excitement, usually die as quickly as they arise. It is the slow, almost imperceptible change that works wonders in the long run. The advance is not appreciated or valued until, through almost invisible steps, a real change has been accomplished and we can look back and see an actual advance in progress.

The orthodontic profession has always been open to suggestion, and new ideas are eagerly sought for and experimented with by the members. Most

*Read before the Fourth Annual Meeting of the Southern Society of Orthodontists, Nashville, Tenn., January 21, 22, 1924.

that is good is retained and broadcasted to others interested in our specialty, dentists and physicians included; for the aim is to educate not only the members of our society but to advance the knowledge of orthodontia among other professions where it will result in benefit to humanity.

Only a very few of our problems are being gradually solved. As in every other science, with each advance step that is made the field for study and research becomes more uncovered. The past twenty years have witnessed untold progress in orthodontia and yet an analysis of our literature covering this period will probably leave us with the conviction that we have hardly scratched the surface. One point of real advantage that has been gained in this time is a complete realization of our ignorance of many of the questions upon which, twenty years ago, we felt fully informed. Let us hope that this is the beginning of wisdom.

In closing, may I quote the following sentiment expressed by a writer whose name I cannot now recall? "To do the right thing at the right time; to do something better than it was ever done before; to eliminate error; to know both sides of the question; to be courteous; to be an example; to work for the love of the work; to anticipate requirements; to develop resources; to recognize no impediments; to master circumstances; to act from reason rather than rule; to be satisfied with nothing short of perfection."

PRACTICAL PEDODONTIA, OR JUVENILE OPERATIVE DENTISTRY, AND PUBLIC HEALTH DENTISTRY

By Floyde Eddy Hogeboom, D.D.S., Los Angeles, Calif.

(*Continued from March issue.*)

CHAPTER III

CAVITY PREPARATION IN DECIDUOUS TEETH

THE RUBBER DAM

MANY times a rubber dam is of great assistance in proper tooth preparation. Usually the child's mouth is full and running over with saliva and it is next to impossible to keep the tooth in a dry condition.

There is only one rule for the application of a rubber dam on a deciduous tooth.

Place the rubber dam on the tooth to be operated on only.

In a child's mouth in which the majority of the deciduous teeth are present, the first and second deciduous molars are the only teeth which may call for the use of the rubber dam.

Frequently in applying silver nitrate on an anterior tooth the rubber dam is slipped on and held by the first two fingers or finger and thumb while the medicament is being applied.

Technic of Application.—In applying the rubber dam to the upper or lower first deciduous molars use a bicuspid clamp.

Punch a medium sized hole in the dam and with the clamp seated on the forceps slip the rubber over it before placing the clamp on the tooth.

Fold the rubber in a manner that is easy to grasp by the left hand and slip the clamp over the tooth.

Have the assistant ready with the elastic holder and quickly adjust it to the child's head. A little practice will prove the ease with which this can be done. If the child is properly handled, this may be done with the majority of children without much difficulty.

In applying the rubber dam to the second deciduous molars, the upper or lower, use a universal molar clamp. Follow the same methods of application as with the first deciduous molar.

Fig. 36.—Marked casts showing where cavities usually occur in deciduous teeth.

BLACK'S CAVITY CLASSIFICATION, MODIFIED (Fig. 36)

Class I. Cavities beginning in structural defects in the teeth, pits and fissures.

Class II. Cavities in the proximal surfaces of the bicuspids and molars, (also deciduous molars). In the case of the deciduous teeth often traceable to open spacing incident to interstitial growth.

Class III. Cavities in the proximal surfaces of the incisors and cuspids which do not involve the removal and restoration of the incisal angle.

Class IV. Cavities in the proximal surfaces of the incisors which do require the removal and restoration of the incisal angle.

Class V. Cavities in the gingival third—not pit cavities of the labial, buccal or lingual surfaces of the teeth.

BLACK'S ORDER OF PROCEDURE IN CAVITY PREPARATION

1. Obtain the required outline form.
2. Obtain the required resistance form.
3. Obtain the required retention form.
4. Obtain the required convenience form.
5. Remove any remaining carious dentin.
6. Finish the enamel wall.
7. Make the toilet of the cavity.

CLASS I CAVITIES (Figs. 37, 38)

These cavities in the deciduous teeth are usually found on the occlusal surface of the deciduous molars.

The pits and fissures afford a starting point for caries. Because of the comparative thinness of the enamel coupled with the imperfections almost always present on the occlusal surfaces foods lodge and acid fermentation taking place, a cavity is starting.

Fig. 37.—Class I cavity in a lower second deciduous molar.

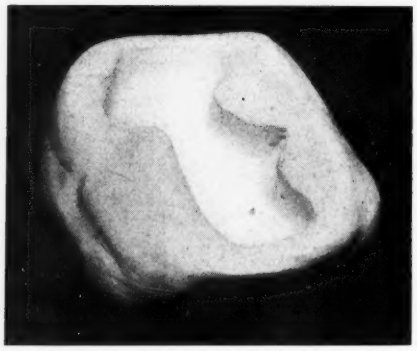

Fig. 38.—Class I cavity in an upper second deciduous molar.

1. *Outline Form.*—Under outline form it is necessary to have a mental picture of the area of the tooth surface involved.

In preparing these Class I cavities *it is advisable to use hand instruments as much as possible as the child seems to tolerate better this form of technic.*

Break down the overhanging enamel bringing the enamel margins well up on the slopes of the cusps.

2. *Resistance Form.*—It is necessary to have as flat a base in the deciduous tooth as in the permanent tooth preparation. Often the decay extends deeply and in that case a pulp protection is called for.

3. *Retention Form.*—As a Class I cavity has four walls no special retention is called for otherwise than to have parallel walls.

4. *Convenience Form.*—Likewise no special convenience form is required as these cavities are very accessible.

5. *Removal of Carious Dentin.*—Special attention is necessary in removing carious dentin in Class I cavities.

Usually the caries is not so deep that the pulp is involved. So careful spooning of the carious material will usually care for the softened dentin.

Remove all carious dentin if possible, but if the pulp is to be involved by removing a hard piece of carious dentin it is better to cauterize with some reagent with the hope of preserving the pulp.

Fig. 39.—Class II cavity in a lower second deciduous molar.

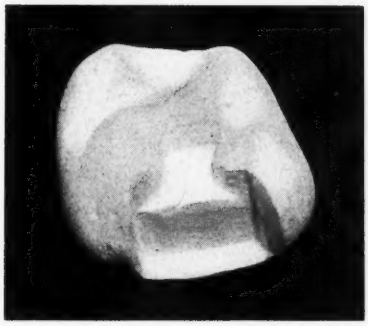

Fig. 40.—Class II cavity in an upper second deciduous molar.

Fig. 41.—Class II cavity in the mesial portion of a lower first deciduous molar.

Fig. 42.—Class II cavity in the distal portion of a lower first deciduous molar.

But if necessary expose the pulp, devitalizing and removing the pulp. Fill the canals and place the permanent filling.

Insofar as possible keep all saliva from the cavity while filling. In very young children this is very hard to accomplish, but with some practice

it can be done. If the child is old enough and will stand for it, place the rubber dam and proceed under dry conditions.

CLASS II (Figs. 39 to 47)

This type of cavity occurs in the deciduous molars. It is this class of cavities which most children develop and hence requires very careful study.

During the transitional period slight opening of the contacts may occur between the first permanent molar. Fibers of food will collect and a nidus

Fig. 43.—Class II cavity in the mesial portion of an upper first deciduous molar.

Fig. 44.—Class II cavity in the distal portion of an upper first deciduous molar.

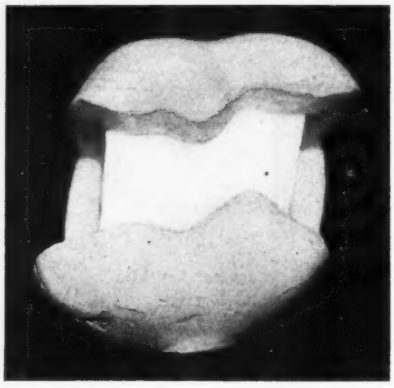

Fig. 45.—MOD cavity in upper second deciduous molar.

of decay starts just below the marginal ridge. Or perhaps a Class I cavity may become a Class II cavity by the breaking down of an enamel wall.

1. *Outline Form.*—The occlusal surface margins must be brought well up on the cusp slopes. The mesial and distal aspects must be extended well out into the embrasures.

At this point it is well to review the anatomy of the deciduous molars, because this calls for a slight change in cavity preparation. The gingival

seat does not allow for a depth of more than a millimeter, without endangering the pulp.

If the buccal and lingual extensions are placed too far out, it leaves very little substance for boxing in the mesial or distal portions.

2. *Resistance Form.*—The gingival seat is secured by taking a medium small inverted cone bur and cutting straight across. It is necessary to reverse the bur at one angle to keep it from traveling around the tooth.

With either a fissure bur or an inverted cone bur cut across the occlusal portion for a step always keeping in mind the outline form. With small enamel hatchets square up the gingival portion that was not accessible to the bur.

Fig. 46.—MOD cavity in lower second deciduous molar.

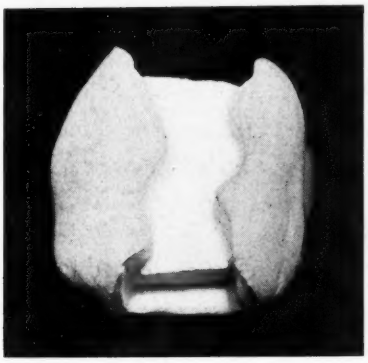

Fig. 47.—Model showing pulp chamber open and cleaned out ready for a root canal filling.

3. *Retention Form.*—With the same enamel hatchets parallel the proximal walls. Often a slight undercut will assist in holding the filling material. The junction of the occlusal and proximal portions of the cavities is the weakest point. The step part must be gradually widened out into the proximal portion avoiding a sharp junction. If there is a sudden flare instead of a gradual divergence a break will occur when stress is brought to bear near the marginal ridge.

4. *Convenience Form.*—There is no special form called for as these cavities are easy to reach.

5. *Removal of Remaining Carious Dentin.*—Great care must be exercised in removing caries in Class II cavities. The pulps are usually exposed near the gingivoproximal line angle; therefore use a large spoon at this point so as not to make a sudden puncture into a nearly exposed pulp. But, if necessary remove the carious dentin and proceed with the extirpation of the pulp.

CLASS III

These cavities occur in the mesial and distal surfaces of the incisors and cuspids. These teeth are rather difficult to handle and consequently we have to use a subterfuge instead of a filling in many cases.

The deciduous central and lateral incisors are anatomically very small, and since the pulp is very large in proportion to the crown of the tooth a strong cavity preparation is not possible. It is advisable to use a permanent cement in these teeth if a fairly strong cavity can be prepared; if not, silver nitrate may be used. The rubber dam is slipped on and the medicament applied. If possible, strong sunlight should be made to change the silver nitrate to a black metallic salt.

Howe's ammoniacal-silver nitrate is just as good and much quicker. Apply the ammoniated sliver solution to the tooth; then apply the precipitating solution to this. Of course it leaves a black tooth which in these days of the "movie" child may be quite a drawback.

In preparing the cavities in the mesial or distal of the cuspid more tooth structure is available and therefore a permanent filling is possible.

CHAPTER IV

FILLING MATERIALS USED IN DECIDUOUS TEETH

There is a diversity of opinion as to what constitutes the best type of filling material for deciduous teeth. Therefore, I shall give a synopsis of the filling materials advocated by different dentists.

1. *Gutta-Percha.*—Base plate gutta-percha made into convenient sized discs are used by many operators for filling cavities in deciduous teeth.

2. *Black Copper Cement* is one of the easiest plastics for filling cavities, at the same time having a relatively long life. Many times a large open cavity in which it is impossible to prepare any typical preparation can be filled with black copper cement which will give satisfactory results for a few months and perhaps years.

The copper salts have some inhibiting effect upon caries. Dr. Ames explains this inhibiting effect. He says, "By sterilizing properties of filling materials it is, of course, not meant that a sterile condition of the oral cavity and its fluids can be promoted to any very appreciable extent. There is unmistakable clinical evidence, however, that there is a salutary effect upon tissue and fluids in immediate proximity to certain fillings from salts formed by an inappreciable waste thereof. Our chief interest is in what may happen beneath fillings.

"A state of sterility in which bacteria cannot exist and reproduce, is, as a general proposition, brought about as a moist condition by embalming, and as a dry condition by mummification. The latter state may be said to be embalming perpetuated by absence of moisture after sterilization has been accomplished.

"Mummification of more or less disorganized tissue beneath a filling and protected by it from the oral fluids, is best accomplished by a material capa-

ble of giving off some of its substance to help create a product of a penetrating nature, i.e., a creeping salt. If the product formed between the filling material and the exciting agents present, and infiltrated into the disorganized tissue, is such that there results a compact mass, sterile under the conditions, or even immune to destructive influences under altered conditions, the filling material with which this is possible, is valuable."

Because of its widely known properties I am using the words of the manufacturer of Ames' black copper cement to explain its peculiar properties and working technic:

"The first oxyphosphate of copper offered the profession was Ames' Original Oxyphosphate of Copper (now known as Embalming Pulp Capping Cement), and since its introduction in 1891 it has gained in popularity, slowly at first because of its color and the tedious manipulation required for best results, but more rapidly later because its wonderful preservative qualities once observed surely breed enthusiasm.

"The New Process Oxyphosphate of Copper does not require that tedious manipulation called for by the original. It sets very promptly when subjected to the temperature of the mouth or a higher temperature produced by hot air, water or gutta-percha.

"The powder of Ames' Embalming Pulp Capping Cement is 100 per cent specially prepared black oxide of copper. The powder of New Process Oxyphosphate of Copper contains about 90 per cent of the same black oxide of copper and nearly 10 per cent of a specially prepared oxide of cobalt for the benefit of improved working qualities.

"We have used oxide of cobalt in this way for so many years that it is positively futile and ridiculous for any one to attempt an arsenic scare in connection with the use of cobalt. Cobalt can be freed of arsenic more easily than zinc. In neither case is it a chemical difficulty.

"Although the 'New Process' largely replaces the 'Embalming Pulp Capping Cement' for general purposes, there are yet applications to which the 'Embalming Pulp Capping Cement' is peculiarly fitted, and these in a few words are, the capping of pulps, where the color is admissible and where the embalming of considerable decalcified dentin is needed. For this latter purpose it is sometimes advisable to use a layer of 'Embalming Pulp Capping Cement' and cover this with 'New Process' or some other filling.

"While the New Process Oxyphosphate of Copper is primarily a germicidal cement it may safely be said that this material is the best of cementing agents and were it not for its color there would be no necessity for a zinc cement. It may be used to excellent advantage in any case where its color does not preclude its use, giving the strongest attachment known for crowns, orthodontia appliances, inlays, and was used extensively in the Allied Armies for setting splints in fracture cases.

"Three liquids are provided, quick, medium and slow, the quick for midwinter conditions and the slow for midsummer use. This material is put up with medium setting liquid, unless otherwise ordered, Ames' 'C' to liquid may be blended with the liquid of these cements for retarding setting; one

drop of 'C' to three drops of either of these liquids will decidedly retard setting when desirable.

"These cements should be mixed by adding powder in small portions until a slightly gummy consistency is attained, after which it should be further spatulated until it attains a decidedly *gummy consistency.* From such a mix there will be prompt setting. Long spatulation after adding only enough powder to give slight gumminess, is the main secret of success. The adding of only enough powder to give slight gumminess, may be gauged by adding powder only to the point at which the mixture ceases to be thoroughly liquid, and takes on a state in which the material when drawn together by the spatula will tend to keep form instead of immediately squatting because of the liquid state. They should never be mixed to a stiff putty-like consistence."

3. *Fleck's Red Copper Cement.*—Dr. Paul Barker of Denver is perhaps the outstanding advocate of this filling material, which is said to have a high antiseptic and germicidal value. When well set it is hard and impenetrable and of a red color which does not stain the tooth structure. The directions for mixing are as follows:

"Use a german silver, bone, agate or copper, but never a steel spatula. Draw into the liquid on the slab a small quantity of powder, spatulate just enough to thoroughly mix powder and liquid. Add another small quantity and as before, spatulate until the mix will flow on the spatula, but not drull from it. Then put in place without further spatulation."

4. *Silver Amalgam.*—Dr. A. C. La Touche in his lectures gives the following interesting account of amalgam manipulation:

"Amalgam is a composition of mercury with another metal, or an alloy of two or more metals, and is made at ordinary temperature by rubbing the mercury with finely divided particles of the metal or alloy.

"Its use in the filling of teeth was begun early in the last century. It was first spoken of in dental literature along about 1839, no accurate data being available as to its first use previous to that time.

"Those who first used it were considered charlatans and were looked down upon by the better men in the profession and its use frowned upon even up to within a few years ago.

"The first amalgam used was made by filing a silver coin and rubbing these filings with mercury. It was very hard to amalgamate and made a harsh mass that set very slowly.

"The first decisive steps towards its improvement were made by adding tin, which caused it to amalgamate more easily and form a much more plastic mass which hardened quickly.

"Up to 1895 very little of a definite nature was known of the physical characters of amalgams. It was well known that most of the amalgams expanded badly, but no particular effort, or at least no progress, had been made toward correcting the expansion. As a result of Dr. Black's work, we now have amalgams that, if properly manipulated, make good, substantial fillings with the minimum of expansion or contraction.

"It was found that an alloy of 70, or under, of silver with the balance of tin, shrank; that one of 75, or over, of silver expanded. That brought the proportions of silver and tin down rather closely. That is, an alloy 72.5 of silver and 27.5 of tin gives, when annealed, the minimum of expansion and contraction. That is as nearly correct as possible with the materials we have. No fixed formula is possible for general use, in that it is nearly impossible, at least would be too expensive, to get the pure metals.

"Then we have the annealing entering as a factor in the contraction and expansion. It was found that an alloy of 65 silver and 35 tin gave a fixed filling when made of freshly cut filings: a month later the same cuttings gave a filling that shrunk badly; that less mercury was necessary to amalgamate, the mass was softer and setting slower.

"It was found that these changes could be brought about by boiling in water for a few minutes; this constituted the annealing. Continued annealing does not affect the contraction or expansion, but it does affect the amount of mercury required and the setting, continued annealing giving a slow setting alloy.

"Copper is the only other metal that may be added to the tin and silver alloy and that in not over 5 per cent makes for greater strength.

"All other metals tend to make a weaker amalgam.

"In getting the greatest strength in amalgams the manner of mixing and packing are important factors, next to the correct preparations of the alloy. The strongest amalgam is produced when just the right amount of mercury is used, which is sufficient to make a plastic mass that will take the imprint of the skin markings after strong, vigorous kneading. More mercury weakens it. If too little mercury is used the amalgam is brittle and will not pack and cohere well.

"The age of an alloy also figures in its strength. The longer it stands or the older it is, so proportionately weaker it becomes.

"Now we have the amalgam question sifted down to two propositions: The correct alloy or the preparation of the metals, that factor over which we have no control in the manipulation, and the manipulation of it to get satisfactory results. In getting the correct alloy we have to depend upon and trust the manufacturer. Therefore, use only the best. Do not tamper with the cheap alloys. Manipulate it correctly to get the best results.

"The exact amount of mercury is best found by trial. It will usually be about 50 or 60 per cent.

"The mass should be well kneaded, and should there be an excess of mercury it should be expressed as soon as possible. The kneading should be continued until there has begun to be slight stiffening or until it has begun to set, then packed into the cavity as rapidly as possible.

"Before mixing the alloy and mercury, everything should be in readiness. Pluggers should be as large as will easily go into the cavity; have serrated points and the portions of amalgam should not be introduced in too large pieces. Pack and step as in placing gold; that is, from the center of the mass towards the margins.

"All cavities for amalgams should have four walls; therefore, in proximal cavities we employ the matrix.

"In using small pluggers in angles and along the walls, force enough should be used to pack the amalgam, but not so great as to force the instrument into the material already packed. The filling should be built up evenly, using in the main large pluggers; using considerable force until the margins are covered and a little over, then a large plugger bringing compression on the whole mass with a shaking motion with all the force that the patient can stand without discomfort. Hold for a few seconds. In two or three minutes the excess may be trimmed away and the filling shaped to form.

"The whole principle of making perfect amalgam work is contained in the one word—compression.

"The idea that amalgam is a cheap filling to be slapped in in any way should be discarded. With the amalgams we now have the fillings are nearly as good as gold, but harder to make.

"There should be no discoloration of the tooth structure under amalgam any more than gold. Any such discoloration is evidence of leakage just as in a gold filling, and shows a fault either in the amalgam or in the manipulation."

5. *Copper Amalgam.*—It is generally acknowledged that copper amalgam fillings retain good margins, when they are once made good, better or more perfectly than any other plastic filling material.

Copper amalgam does not flow; it suffers no change of form under stress except to crush to atoms. After it has once fully set, its form cannot be changed by stress at all. Within the limits of its strength it is as rigid as hardened steel. It will fly to pieces, but it will neither bend nor compress. As a filling material it is absolutely rigid. (Black.)

Copper amalgam is peculiarly affected by manipulation, readily adapted to the walls of the cavity, and this adaptation is not broken up by the construction of the mass in setting, as is the case with other amalgams. When it has once hardened in adaptation to the walls of the cavity, the adaptation is permanent.

Dr. Black made the following statement which caused us to run some bacteriologic experiments on different filling materials, but more particularly with reference to copper amalgam. His statement was that "the power of the material (copper amalgam) in the arrest of caries is in these physical properties, not in any chemical or disinfectant property of the copper or its salts."

To make these tests, uniform sized discs of copper amalgam, silver amalgam, silver cement, crown and bridge cement, 22 K gold plate, zinc cement were made. Dr. I. L. Hurst of the Bacteriological Laboratory, University of Southern California, College of Dentistry, then plated them out in cultures of some of the most common species of bacteria found in the mouth and incubated for forty-eight hours. Microscopic slides from the areas around the discs were made and found to be negative to the extent shown

by the lack of pigmentation. Bacillus prodigiosus were used to make the pictures, taking advantage of the heavy pigmentation.

In Fig. 48 the largest areas are copper amalgam, the smallest being a disc of silver amalgam. There was practically no area around the silver, showing its lack of any inherent inhibiting effect upon the organisms.

In Fig. 49 the largest area appears around the copper cement. The next area in size is around the disc of crown and bridge cement. There is no area around the 22 K gold plate. Some may think the acid in the cement may have some effect. This is possible, but not probable, as the discs were carefully handled.

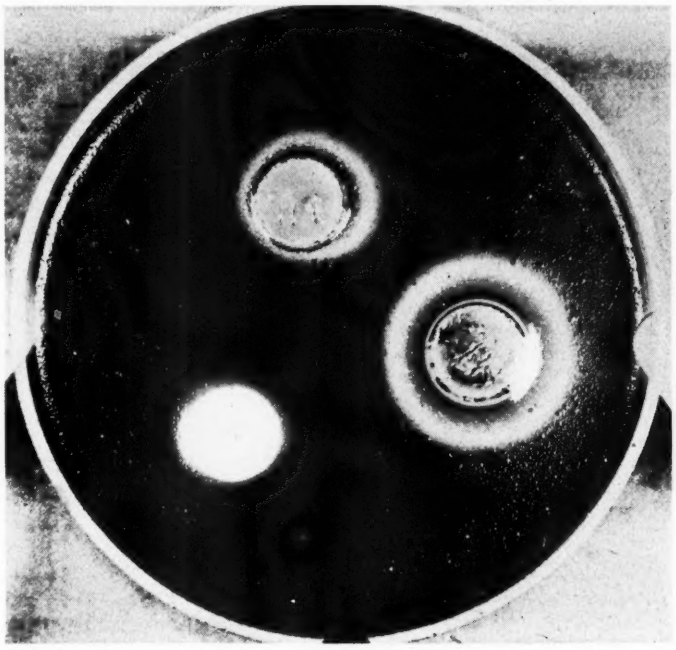

Fig. 48.—The largest areas are copper amalgam, the smallest being a disc of silver amalgam. There was practically no area around the silver showing its lack of any inherent inhibiting effect upon organisms.

In Fig. 50 are shown some areas around the silver and zinc cements but very small and none around the silicate.

In conclusion, we were led to believe upon laboratory and clinical evidence that there is disinfecting and inhibiting effect produced by the copper amalgam upon the immediate surrounding structures of the tooth.

6. *The Acolite Inlay.*—There are some Class II cavities whose walls are so badly broken down that the copper amalgam or any other plastic material affords very poor retention. So it has proved satisfactory to make inlays of acolite for those teeth. The advantages for teaching are

1. Better cavity preparation.
2. More permanent restoration.
3. Good margins.
4. Proper anatomic markings.
5. Correct contact point.

With copper amalgam it is practically impossible to make an anatomic contact point. The question is immediately asked why not use gold inlays? If the patient can pay for them, that is the thing to do. The majority of clinical patients will not, but they can and will pay for this restoration. The student learns the technic and if he so desires he can use gold when he enters private practice.

Directions for Using Acolite.—"General directions for investing and casting gold apply also to Acolite, and the same general methods of preparation should be employed.

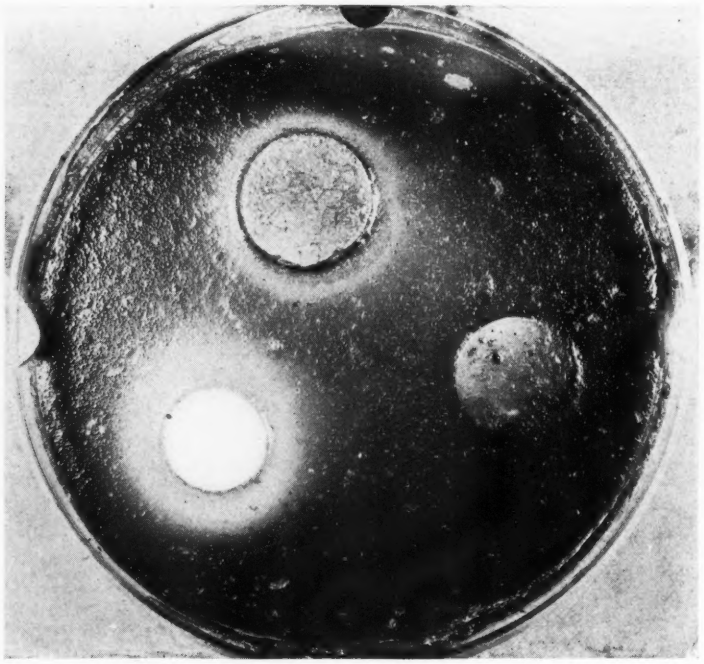

Fig. 49.—The largest area appears around the copper cement. The next area in size is around the disc of crown and bridge cement. There is no area around the 22K gold plate.

"Remove the wax model from the cavity and invest the same as in the case of a gold inlay, except that the wax model should not be placed so near to the bottom of the flask.

"Heat the flask until the wax is entirely burned out. Before casting allow the flask to cool down below the fusing point of the metal, which is 480 degrees Fahrenheit. At the time of casting, the flask should be cool enough to be picked up by the naked hand.

"Place the proper quantity of Acolite in the crucible surface of the flask, and barely fuse it, being very careful to avoid overheating, as that would burn the metal and destroy its qualities.

"Much less force is necessary than in casting gold. If cast on the Elgin Appliance, do not use more than 10 inches vacuum. If the casting force is to be created with a damp asbestos pad, place a heated iron washer on top of the case to generate the steam. Allowance must be made for this washer

at the time of investing, in order that it may not interfere with the pad and flask in making a perfect seal at the moment of casting."

7. *Silver Nitrate.*—While silver nitrate is not a filling material, it occupies a prominent place in caring for deciduous teeth. Silver nitrate when applied to dentin forms a hard coagulum which resists caries.

In applying it a rubber dam should be held by means of the thumb and finger over the tooth. A crystal is crushed on a slab and with a moist pellet of cotton is placed on the carious place. Direct sunlight is necessary to turn the silver nitrate coagulum dark blue; otherwise very little is accomplished.

8. *Ammoniated Silver Nitrate.*—This is the silver precipitation method.

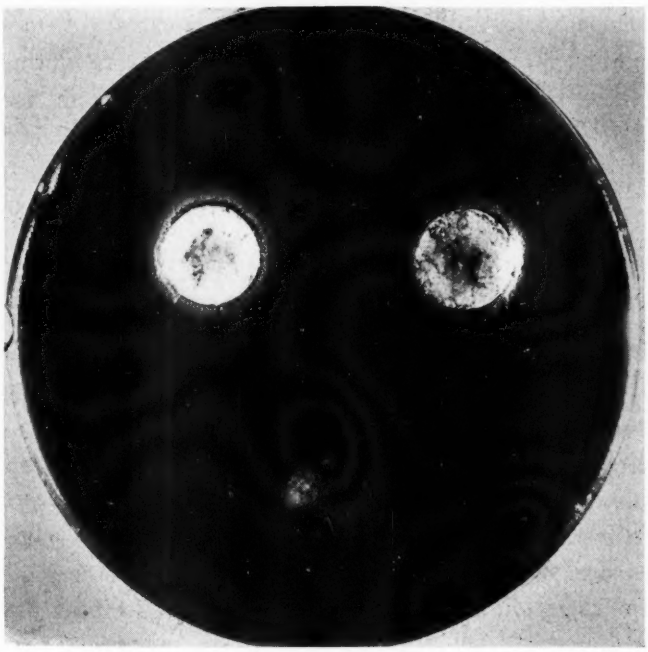

Fig. 50.—Shows some areas around the silver and zinc cements but very small, and none around the silicate.

Dr. Endelman gives the following directions for making the two solutions: "Make up a saturated solution of silver nitrate in distilled water. It is about 2¼ to 1. Let it stand all night and decant it. Then add 28 per cent ammonium hydroxide until the dark and cloudy precipitate forms and then disappears. Upon the addition of 25 per cent formalin, metallic silver is precipitated."

This solution can be bought already prepared, known as Howe's solution. It is more convenient than silver nitrate. In applying it, touch the tooth structure with the ammoniated silver nitrate soluion. Wait about two or three minutes and place a drop of formalin or eugenol on the same location. Metallic silver is precipitated which sterilizes and impregnates the tooth structure.

To remove stains treat with iodine which forms silver iodide, and wash off with a saturated solution of sodium hyposulphate. Always use a dam.

Anterior deciduous teeth very often decay, and because of the small amount of tooth structure, cavity preparation is practically impossible. Hence the application of silver nitrate is indicated.

9. *Gold Inlays.*—Gold inlays, without question, are the best permanent restorations for posterior teeth in children where any restoration of a permanent nature is indicated. There is no better way to restore tooth form in deciduous teeth than with an inlay. We are heartily in favor of using gold inlays for compound cavities in deciduous teeth. However, the inlay does not seem to be as well adapted as plastics for restoring the large majority of carious teeth in children because of other factors such as age, developmental changes in tooth structure, ability to prepare ideal inlay cavities, etc.

In the majority of first permanent molars in which permanent restorations are indicated the gold inlay meets the ideal conditions for tooth restoration. Silver amalgam restorations should be discouraged, and gold inlay restorations encouraged, wherever judgment calls for the best results.

REPORT OF CASE WITH SUPERNUMERARY TEETH*

By Walter Hyde, D.D.S., Minneapolis, Minn.

THE patient was a boy eleven years old. Models before treatment show marked lack of development in both arches. In the upper, but one central incisor was in eruption. The x-ray picture of the region over the missing incisor showed a confusion of teeth that later proved to be two oddly shaped supernumeraries and the central incisor. Both arches were developed, the extra teeth were removed and the incisor brought to place with the result shown in second model. Treatment required eighteen months, most of which was conducted on a schedule of visits four weeks apart.

*Given before The American Society of Orthodontists, Chicago, Ill., April 9-11, 1923.

INDIRECT METHOD OF MAKING ORTHODONTIC APPLIANCES*

By L. M. Waugh, D.D.S., F.A.C.D., New York, N. Y.

In presenting an indirect method specially adapted to the construction of mechanisms for the moving of malposed teeth into normal position, it is desired to accord originality for the basal principles to the general practitioner.

The earliest application was made in the department of dental prosthesis, for, from the very beginning, artificial dentures were constructed upon reproductions of the parts to be fitted. In operative dentistry, it came into application with the advent of the baked porcelain inlaying method. The technic as applied to inlays was taught me by Dr. F. T. Van Woert in 1908. The indirect method as applied to restorative operations demanding the greatest nicety of adaptation, such as porcelain and metallic inlays and porcelain shell crowns, has been gradually improved and adopted by a majority of the most exacting practitioners. Convinced of the potent possibility for accuracy, I began, eight years ago, to apply the general principles of the indirect method, as used in inlay and crown technic, to the construction of plain bands for orthodontic appliances. The various steps were gradually modified and elaborated to meet the specific needs of orthodontia, and the technic described in this paper has now been used, with but minor modification, in every-day practice for the past three years. The continued satisfaction that the method has given, led me to demonstrate the technic by means of table clinics on two occasions at local meetings, and has impelled me now to brave a wider criticism by presenting the progressive steps in a way that it is hoped will be more complete and comprehensive.

The primary motive is to offer a technic by which *greater accuracy* in the construction of appliances may be obtained. There are, however, other advantages of major importance. A strong, properly-fitted anchor band is the first essential to an efficient orthodontic appliance of the fixed type.

The band technic to be outlined is advocated for the making of *anchor* bands only. Those for individual tooth movement are not subjected to the stress of the leverage that is brought upon bands supporting arches; therefore, they may properly be made of band material so thin that it can readily and quickly be fitted directly in the mouth. The selection of a suitable metal is the first prerequisite. It must combine in proper degree the qualities of strength and of adaptability. Unfortunately, these two qualities are almost diametrically opposed. Malleability and ductility—softness—cannot be found in the same single metal or in an alloy which also possesses much rigidity and strength; therefore, a compromise must be made in the alloying. In

*Read before the Twenty-second Annual Meeting of the American Society of Orthodontists, Chicago, Ill., April 24-26, 1922.

our experience, a band material of proper thickness that is sufficiently pliable to be readily adapted to a tooth in the mouth lacks, in many cases, the necessary strength to withstand the strain brought upon it by the leverage of the arch. It is my belief that loosening of bands cemented to teeth is caused much more by stretching and consequent change in shape than from poor cementation. If this be true, the nicety of adaptation of a relatively soft and yielding metal cannot overcome the inherent weakness of a band material.

In the experience of the writer, coin gold and more pliable gold alloys in thickness of 0.006 inch, are not sufficiently strong for anchor bands. Reinforcements of solder in the buccal and lingual grooves, or a line of solder traced around the occlusal edge strengthen that margin but do not prevent a band from stretching along the cervical edge, the strain from leverage of the arch being as great there as at the occlusal. Metals commonly known as "gold-platinum alloys" have given greatest satisfaction.

The formula of Louis J. Weinstein* known commercially as "Ney-ora E," has proved most satisfactory both for *arches* and *anchor* bands. His "Formula 3" is preferred for bands to be fitted directly to the tooth (so-called pinch bands) for two reasons: (a) The somewhat higher fusing point is much preferable in a thin band material; and (b) it is more pliable than the "E" metal.

For anchor bands, "Formula 3" (0.006 inches in thickness) was used for over two years and gave greater satisfaction than did any metal previously tried. During the past year, "Ney-ora E" (0.006 inch in thickness) has been tested with constantly increasing satisfaction. Its stiffness and great edge strength are especially to be commended. By the technic described, bands of the greatest nicety of adaptation can be made. Its fusing point is 1960° F. and, therefore, 22K solder can be used for the joint, and it holds its color very well in the mouth. (Fig. 1.)

The technic will be described in two parts:

I. The Chair Technic.

II. The Laboratory or Bench Technic.

I.† With patient in the chair the progressive steps are:

(a) Spray the mouth and remove separating ligatures.

(b) Cleanse anchor teeth thoroughly to remove food debris and microorganisms by scrubbing the surfaces by means of a tightly rolled pledget of cotton carried in tweezers, moistened with an efficient germicide and dipped into flour of pumice. This may be supplemented by a small bristle brush carried in a hand porte polisher. The bristles should be cut to about 3 or 4 mm. in length. Cleanse the proximal surfaces with "flat floss" charged with flour of pumice. Thoroughly spray teeth and gum margins.

(c) Select a copper band that will nicely slip over the crown, shaping itself to the general outline. (Fig. 2.)

(d) Remove from the mouth, scratch the mesial surface to distinguish it, and trim concave the cervical edge of the band on the mesial and distal sides. With curved beak pliers, turn the cervical edge of band slightly inward. (Fig. 3.—*1* and *2*.)

*The formulas of Mr. Weinstein are not secret. See paper read by him before this society, and published in the Dental Items of Interest, May—November, 1918.

†It is assumed that casts for study, radiograms of the entire jaws and the diagnosis have been made, appliances planned and the separation of teeth to be banded previously accomplished in the preferred way.

(e) Replace on the tooth and press just to the free margin of the gum. Scratch distinct line parallel with the gum margin going well into the embrasures.

(f) Remove and trim the cervical edge with curved shears following the scratch, file smooth and with curved beak pliers turn inward the cervical edge.

(g) Replace on the tooth, press nicely beneath the free margin of the gum, and with the Young band adapters press the cervical edge close to the tooth all the way around. Scratch a line following the gum margin. Remove and trim so that the band goes the proper distance beneath the gum. In the fully erupted tooth, this should be approximately, 1 mm. on the buccal and lingual, and 2 to 3 mm. on the mesial and distal edges. In partially erupted teeth, it may extend farther.

(h) Replace and with band adapters press the cervical edge close to the tooth.

(i) Remove the band, grasp the occlusal edge with soldering pliers and heat in flame,

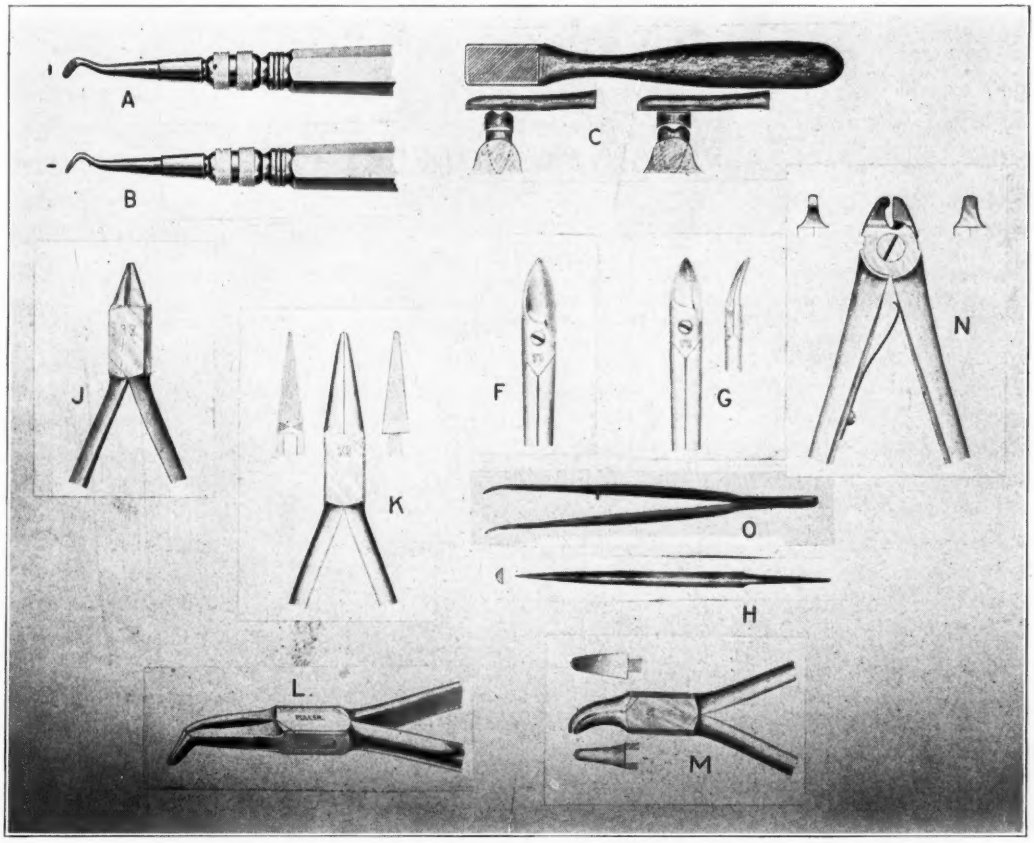

Fig. 1.—The instruments used in the technic. *A* and *B* are serrated band adapters as patterned by J. Lowe Young; *C*, Pullen band depressor; *F* and *G*, plate shears straight and curved, Nos. 10 and 11; *H*, half round metal file 5 inches long, cut No. 2; *J*, short beak pliers No. 139 with one round and one flat beak; *K*, pliers No. 136 with flat beaks, one smooth and one serrated; *L*, Pullen's band-forming pliers; *M*, pliers No. 115; *N*, band contouring pliers No. 145, after pattern of John V. Mershon. Pliers No. 137 are also used at the chair. The beak is curved but less so than *M*, which is used in bench work. Howe pliers No. 110 are also used at the chair.

then melt a ridge of modeling compound about 4 mm. in width from a cool stick around the inside of the cervical edge of the band. (See Fig. 3.—*3* and *4*.) When just cool enough to permit holding the band in the fingers and not burn the gum, press quickly on to the tooth nicely beneath the free margin of the gum, keeping it dry while warming the end of a stick of compound in the flame and place it into the occlusal end of the band, pressing it quickly and firmly with the moistened thumb or forefinger, or a piece of No. 60 tinfoil, at the same time removing the excess of the stick. (Fig. 3.—*5* and *6*.) If this is done quickly, the two parts of compound will fuse and no joint will be discernible. Maintain

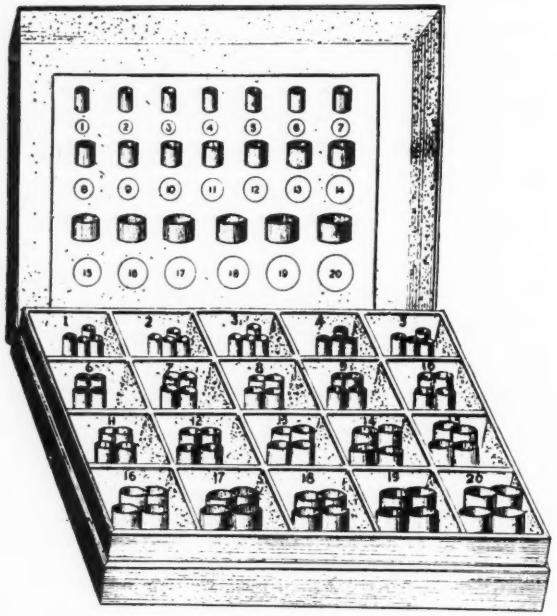

Fig. 2.—Seamless copper bands of varying size can be procured from any dental supply house. Gauge 30 is the preferred thickness. When separation is not sufficient, gauge 36 can be used to advantage.

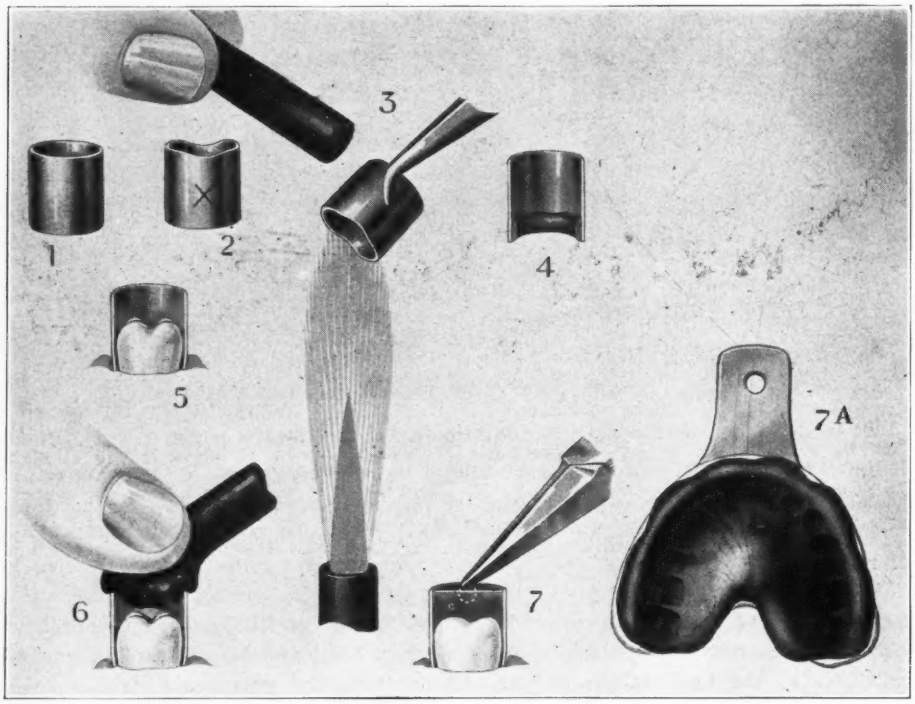

Fig. 3.—*1*, Copper band of proper size to slip over tooth snugly; *2*, same band marked × to designate mesial, and trimmed to follow festoon of the gum; *3*, heating band to melt cool compound from stick as shown in *4*; *5*, band and compound pressed to position on tooth; *6*, softened compound stick pressed into occlusal end of band to complete impression of tooth; *7*, Howe pliers pressed into soft compound on mesial side to afford purchase for straight removal after compound is cooled; *7A*, compound impression of one dental arch for cast for bench technic.

pressure for a half minute until the compound has partly cooled. With Howe pliers press the compound away from the band at a convenient place along the buccal or lingual margin so as to form a place for a firm grasp in later removing the band containing the impression. (Fig. 3.—*7*.) Chill with compressed air or cool water. When thoroughly hardened, make a distinct scratch around the band following accurately the gingival margin, then grasp with Howe pliers and draw the impression *straight off* the tooth. It must not be wiggled as this would result in enlarging the impression, and consequently the die would be too large and the resulting band too big for the tooth. Observe the distance the band extends beneath the gum, all the way round, carefully cutting off any excess with a file.

This is repeated with all of the anchor teeth, usually four in number.

(j) After the last copper-band impression has been removed, accurate impressions of the upper and lower jaws are made in modeling compound. (Fig. 3.—*7A*.)

(k) Separating ligatures are placed, the mouth sprayed, and the patient dismissed.

The average time required in daily practice to make four copper-band impressions of anchor teeth and two compound impressions of the entire arches, embracing the steps as outlined above, is one hour, be it for a young or older patient. There is no pain or discomfort, therefore no delay. By hurrying, it can often be done in forty minutes. The case now goes to the laboratory, the anchor bands and arches are made, and are ready for insertion at the next appointment.

II. The Laboratory or Bench Technic—Progressive Steps:

(a) A piece of cotton roll one inch long is inserted in each copperband impression. The roll must fit snugly and bulge slightly at the margin of the band. Vaseline the roll near the band to keep the plaster from sticking. (Fig. 4.—*8*.)

(b) The copper-band impressions of anchor teeth are imbedded in cast plaster, each in a separate rubber ring. The copper-band impression is pressed down so that about one-eighth inch of the cotton roll is also imbedded in the plaster. The average time for (a) and (b) combined, is ten minutes. The plaster is allowed to set for about fifteen minutes.

(c) The cotton roll is removed and any sharp edges of plaster are smoothed. (Fig. 4.—*9*.)

(d) The impression is now packed with amalgam, preferably of a silver-tin alloy. (Fig. 4.—*10*.) It is well mixed in a mortar and the excess mercury expressed by placing the mass in a piece of kid or chamois and twisting with the fingers. Pliers should not be used as the amalgam must be quite soft and easy to pack. The average time for four is thirty minutes. The amalgam is allowed to set eight or more hours, usually over night. Copper amalgam may be used, but has the disadvantage of badly staining the fingers.

(e) The plaster and copper-band impressions are separated from the die. (Fig. 4.—*11*.) The average time for four is ten minutes.

(f) Making four plain bands on metal dies, final adaptation being made in a swager, followed by pinching and stretching the middle of the band with the Mershon band contouring plier. (Figs. 5 and 6.) The average time for four is one hour.

(g) The bands are now laid aside and the dies placed in proper position in the compound impressions of the upper and lower jaws (Fig. 7.—*A*.) and the impressions poured with cast plaster. The average time is ten minutes. The plaster is allowed to set for twenty minutes.

(h) The modeling compound is softened in warm water and removed, and the casts are trimmed. (Fig. 7.—*B*.) The average time for two is ten minutes.

The total actual time consumed in the laboratory technic, to this state, is two hours and ten minutes.

(i) Accurate casts of the entire dental arches are thus obtained. The anchor teeth being of metal, the bands may be placed in position and removed as often as necessary

without marring the anchor teeth. If care has been exercised in the various steps the casts will so closely reproduce actual mouth conditions that appliances may be adapted with greatest nicety in the assurance that they will fit equally well when placed upon the teeth. By means of free-hand soldering, the desired attachments are added to the bands and the arches completed. Auxiliary springs may be attached in the laboratory. It is, however, usually preferable to add them after the bands have been cemented and the mouth has become accustomed to the arches for a few days.

The average time for adding attachments to the bands and for completing an upper and a lower arch is one hour and twenty minutes.

After the appliances are completed, the dies of the anchor teeth are removed from the casts and filed alphabetically in cardboard boxes of suitable

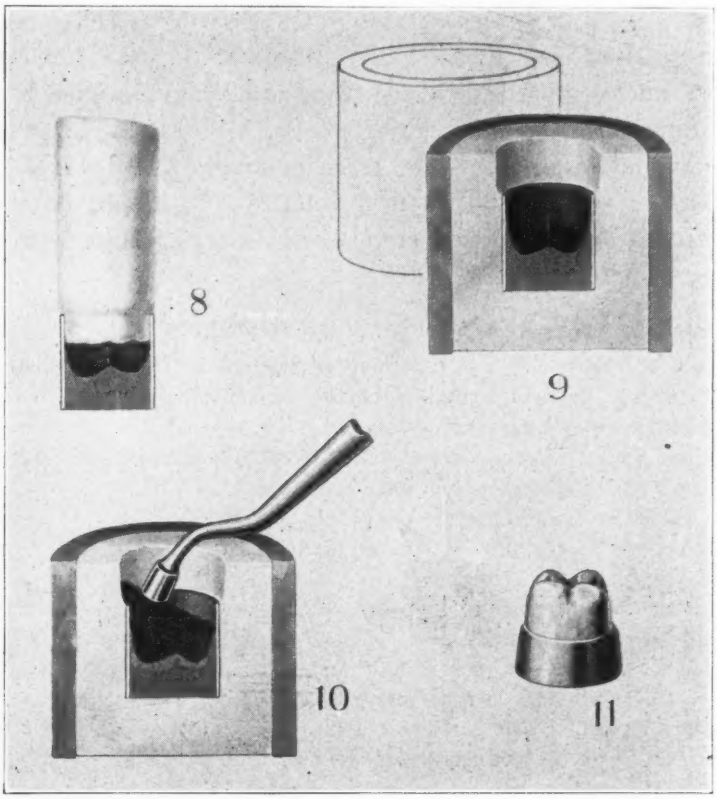

Fig. 4.—*8*, Cotton roll one inch long inserted into copper band with impression of tooth; *9*, impression imbedded in plaster, roll removed and edges smoothed preparatory to packing with amalgam as shown in *10; 11*, die after plaster is removed.

size. If, for any reason, a new band should be needed, it can, upon notification, be made in advance and be cemented at the next appointment.

At the second sitting, all of the anchor bands and the arches are ready for placement in the mouth. If care has been exercised in each step, the bands will go to a definite and positive position on the respective teeth. As a final precautionary measure, the occlusal edge is adapted and slightly burnished with a Young band adapter, the gingival line is carefully scratched on the band to make sure that it extends the proper distance beneath the free margin of the gum. It is then removed, and with the curved-beak pliers, the cervical edge is turned slightly inward, so that it somewhat scrapes and springs over the bulge of the crown.

With bands in position, the arches are placed to make sure that they take a resting, passive position. The arches and bands are removed. The two bands for each arch are cemented with one mix. The cement is allowed to set for 20 to 30 minutes, after which the upper and lower arches are passively placed and fastened, and the patient dismissed. The average length of this appointment is one hour.

From two to five days are allowed for the patient to become accustomed to the appliances; then tooth movement is begun.

Review of the approximate time consumed in the various steps:

Chair Technic.—Done by operator, one hour.

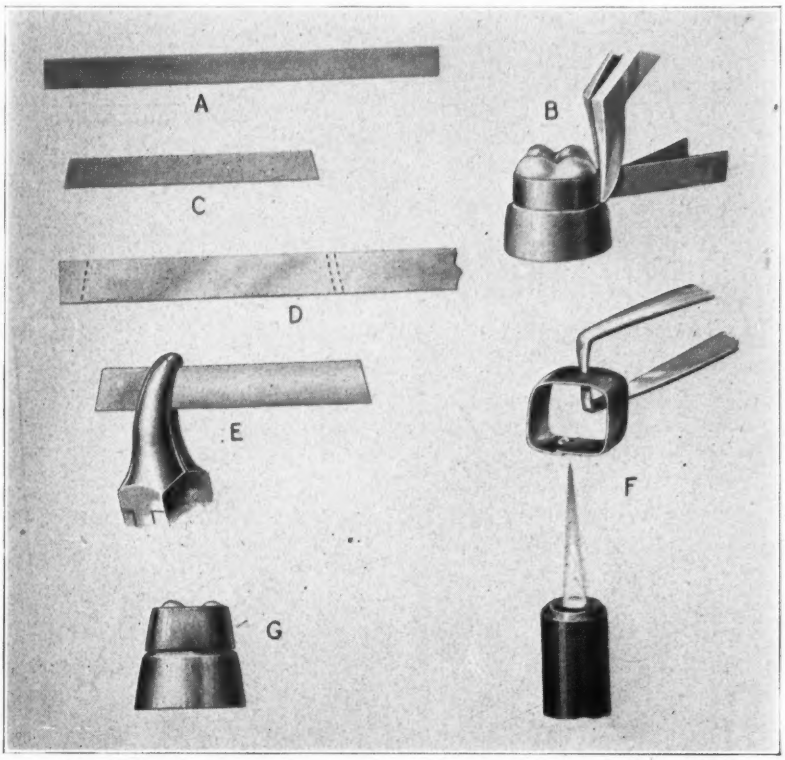

Fig. 5.—*A*, Measuring strip of copper, 0.003 x .15 which is closely pinched around the die with Pullen bandforming pliers *B*, and removed, straightened and cut showing the "flare" as shown in *C*. This is then laid on the Neyore *(E)* 0.006 x .20 band material which is cut with the "flare" and allowing 1 mm. greater length shown by dotted lines in *D*, this being for an overlap joint; *E*, with the curved beak pliers the band material is drawn concavoconvex, then circled and soldered with 22K gold solder, as in *F*. In *G*, the band is to be fitted to the die, in the preferred way.

Laboratory Technic.—Done by a trained assistant, three and one-half hours.

Placement of Appliance.—Done by operator, one hour.

Total Time.—Five and one-half hours.

The actual time spent by the operator is only two hours.

The advantages claimed for the method described are:

1. Anchor bands of more accurate fit and of stronger material can be made and adapted than can be adapted directly in the mouth.

2. Lessening of nerve strain on the patient and the operator.

3. Saving of time for both the operator and the patient.

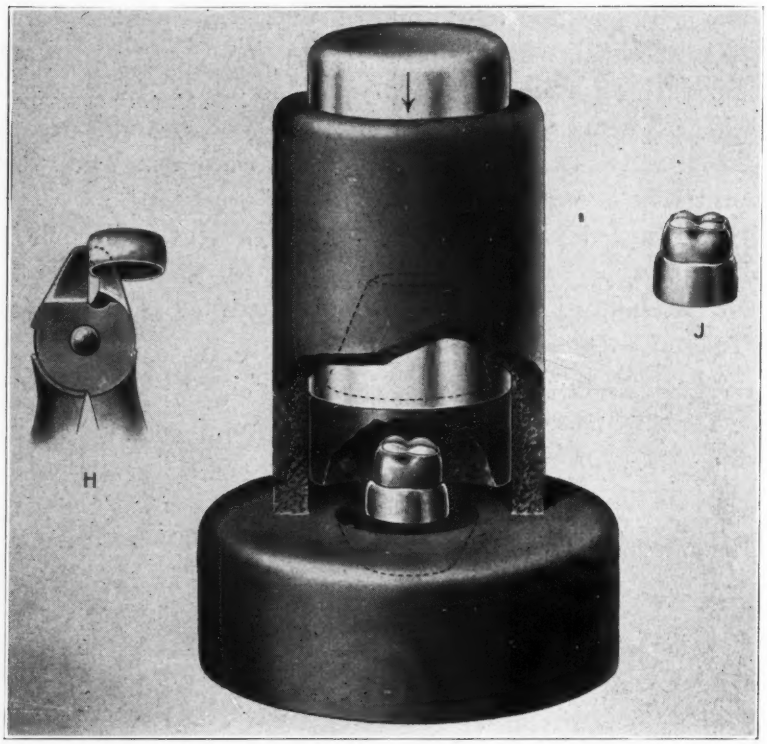

Fig. 6.—*I*, shows band and die in swager; *J*, on die after removal from swager and *H*, the band being stretched about its middle with Mershon pliers to allow for extra thickness of cement about the middle. The occlusal and cervical edges are left to fit just as closely as possible.

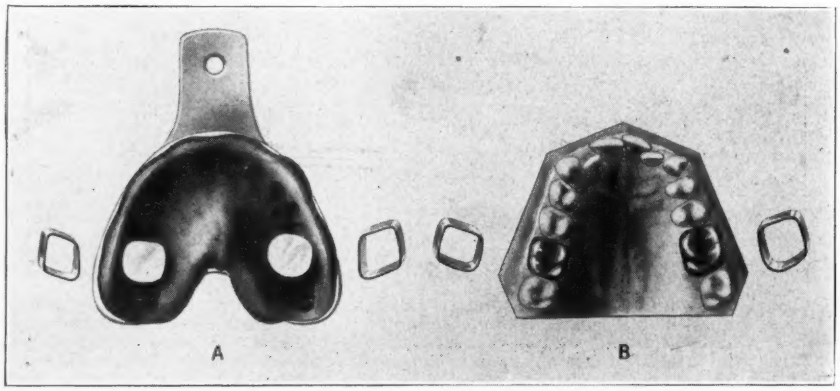

Fig. 7.—*A*, Dies placed in position in impression, after the bands have been removed and laid aside. The cast is then made and after removal of the impression the bands can be fitted as desired to the metal anchor teeth, attachments made and the arches where labial or lingual can be completed and made ready for placement in the mouth at the next appointment.

DISCUSSION

Dr. John V. Mershon.—We have listened, with a great deal of interest to the discussion of a beautiful technic, splendidly demonstrated, for which I pay my respects to Dr. Waugh.

It is rather difficult to discuss a method which one does not use. Therefore, if the chair permits, I will depart a little from actually criticizing or making suggestions regarding Dr. Waugh's method and will describe a method which I employ, in contrast to the one used by Dr. Waugh.

I have been making and using the soldered molar band for a good many years. I will take the subject in the order that the essayist has presented it, first considering the

method. I suppose all of us have gone through the list of metals and materials prepared by the various supply houses, with approval and disapproval. Dr. Waugh has already mentioned the materials with which you are all familiar. I have been using the S. S. White band material known as the "B" Formula with greater satisfaction than any material up to the present time. I use that band material 0.006 thick and 0.18 wide, but the width can be varied. The reason that I prefer this material is because it seems to stay where it is placed; it has a quality which I will call hardness which makes it rather difficult to adapt, but after it is adapted it stays. For the arch wire I use the S. S. White retaining wire, because I like to reduce the number of materials and sizes in my office, and for auxiliary springs I have never found any wire that will begin to compare with this. It has the quality of elasticity and springiness after soldering, and the staying qualities which I have not been able to find in any other wire.

Regarding the question of polishing the teeth in preparation to cementation of the bands, there is one thing which I am sure that Dr. Waugh does but which he failed to mention, that is, after cleaning the teeth with pumice take a piece of flat floss silk and with the pumice thoroughly clean the approximal surfaces of the teeth, which are not reached with the brush.

I have tried several times in my professional career to swage bands and every time I have discarded it, because it consumes more time, with results not as satisfactory as those obtained by the method I have already employed.

I will try to explain the reason why I believe it is difficult to improve a band by making it in a swaging machine over a metal die. In discussing tooth morphology we have to take into account the variations of tooth forms so I will only describe the typical tooth. Let us take the first maxillary molar, as seen from the two sides, and notice the conformations of the tooth. Where it is broad on the one side, on the opposite side in the opposite direction the tooth is narrow; towards the gingiva the reverse is true. In taking an impression of a tooth of this kind you cannot get an impression at the gingiva so that it fits any better than it does at the greatest circumferance of that tooth.

In examining a mandibular first molar tooth from two different views you will note the compensating diameters in passing from the occlusal to the gingival, broadening at one point and narrowing at another. I contend that it is impossible to have any sort of a band come any nearer fitting the tooth at the gingiva than the diameter of the greatest circumference of the tooth, which is located as a rule at the approximal contact point. For this reason I have followed very much the same general plan for making bands for years.

By taking the wire measurement at the greatest circumferance of the tooth, and cutting it and placing it on the band material, and in soldering the band material I always solder in on an angle, making the band smaller at the occlusal side than at the gingival, so that when it is placed on the tooth it will not go on that tooth any further than the position that the measurement was taken, which is the greatest circumferance of the tooth. The metal band has, when soldered, straight sides while the tooth is a combination of curves. The only way to have a band fit the tooth, and be reasonably well adapted is to make the band to be cemented on the tooth, reproducing in detail the curves and contours of the tooth on which it is to fit. This I do by means of the band stretching pliers such as Dr. Waugh has described. This work I have done in my laboratory, and after the band is properly contoured with the stretching pliers, it goes on the tooth rather easily. It is astonishing how accurate are the measurements over an artificial stone model, made from a good modeling compound impression. The bands I have made in this way have always been superior to those I have made by swaging, and the method is a considerable time saver.

I must admit that I have not used the technic in the exact detail outlined by Dr. Waugh, which is really a beautiful technic.

Dr. J. Lowe Young.—Like both of the previous speakers, I have been using plain bands for anchorage for a number of years, but have never claimed to make a perfect fitting band. Because of my experience in bridgework I know that this is impossible

without grinding the tooth, which is not permissible in orthodontic work. A good fitting plain band is preferable to a band with a cumbersome bolt and nut, as has been generally used.

The only difference I see in the technic employed in my office and that described by Dr. Mershon is in taking the measurement of the tooth to be banded. I use a thin strip of copper 0.003 in thickness and 0.015 in width. This is looped about the tooth and carefully pinched. It is then removed from the tooth and cut at the pinch, and then is used for a pattern in cutting the band material, allowing sufficient length to serve as an overlap. The reverse sides of the ends are beveled, then brought together and soldered with 22K gold solder, and the band fitted directly on the tooth.

The plan outlined so nicely by Dr. Waugh takes up a lot of time, and I believe causes as much annoyance as the fitting of the band directly on the tooth.

In pushing the ferrule with the compound over a tooth the opening left is that of the greatest diameter of the tooth, while in the direct method illustrated by Dr. Mershon, the band if made of the proper material will accommodate itself far better to the tooth surface.

Dr. Lloyd S. Lourie.—My chief criticism of the method outlined by the essayist is the time that it consumes. If there are any advantages in his method, it would be worth the extra time, but I have not been impressed by any particular advantage.

I have noticed that he took two hours and forty minutes to make four bands. I can make four bands on the teeth directly, and take impressions of them in an hour. I do not usually make them directly, however, but use an indirect method for the convenience of the patient.

To avoid a seeming inconsistency, I will say it is possible to get a most accurate band by fitting it directly on the tooth—that is, in the general run of cases. But a band nearly accurately fitted can be obtained on the carved model, and it is easy to adjust the band a little to allow for slight deviations in fit when transferred from the model to the tooth. It can be enlarged a little or contracted a little, contouring the edges so as to get as perfect a fit as can be obtained by fitting it on the initial model, and it can be done much quicker.

The other gentlemen who have discussed the paper pointed out that it is absolutely impossible to get a perfect impression of the neck of the tooth and pull it off over the crown, yet the essayist took time to explain the importance of putting modeling compound around the inside of the impression band for the purpose of getting a more accurate impression of the neck of the tooth.

I fear there will be a mistaken idea derived from this paper. One would be led to believe that it is possible to fit a band accurately and absolutely at the neck of the tooth, but such is not the case, and, as Dr. Young has pointed out, I believe it is advisable to trim bands on the gingivo-proximal edge considerably, so that there is no danger of running into the soft tissue. If you use strong material with enough spring it will hold the buccal and lingual edges in contact with the tooth. I use iridio-platinum for this reason.

Dr. Waugh made a good point in stating that the edges of the band shall fit the tooth more closely than the middle of the band.

Dr. Landis H. Wirt.—I believe that one of the reasons some of us get better results in making bands by the indirect method is because we thus eliminate the tendency to fright. Some of our patients are small children for whom we cannot very well make bands in the mouth without getting them frightened, and perhaps hurting them.

Two years ago at the meeting of the Alumni Society of the Dewey School of Orthodontia I gave a table clinic showing my method of making bands by an indirect method which is similar to the one shown by the essayist. The principal difference is that I make my anchor teeth in fusible metal instead of amalgam, by the use of a tray which I designed, and which is an adaptation of the Roach hinged tray, used in removable bridge construction. My tray is round, and fits into the rubber ring that comes with Melotte's outfit.

By using the fusible metal model upon which to make the bands, I am enabled to do this part of the work mornings, when it is usually less convenient for patients to come

in, and they do not have to be excused from school as often. In my territory at least, parents do not like to take the children out of school, and this method enables me to see more of them after school than I could if bands were made by the direct method, and my assistant can make them as well as I.

I think possibly this may be a shorter cut than the method given by the essayist, but I would not presume to say it is a better one.

Dr. Burt Abell.—Some of us have forgotten what Dr. Pullen gave us in a clinic a year or two ago, and if he is here I wish he would tell us about the reserve band he has, how he makes the measurements, and his method of fitting bands.

Dr. H. A. Pullen.—I will briefly describe my direct method, with apologies to the essayist for discussing a method opposite to the one about which he has written, although it may lend interest to the discussion by the comparison. It is but natural that we should have these different methods of making bands indirectly with the fusible metal and amalgam dies, and the direct method of fitting and contouring these bands on the teeth themselves.

There is value in, and a place for, both the direct and the indirect methods of band making. Perhaps some day I may be induced to follow the indirect method more closely than I have, for it presents many advantages in the fine details of the technic, and can be taken almost entirely into the laboratory where one can work on it at greater leisure than with the direct method. Time given at the chair, however, is always at a premium during the rush hours, and for that reason, more than any other, I have given preference to the method of band making which consumed less time at the chair.

Regarding the direct method, there are three reasons why I prefer it. First, because I think that the band thus made is constructed with less effort; second, with as good a fit at the cervical margin and on other surfaces of the tooth; and third, with the minimum amount of time. There is, therefore, much which leads me to cling to my direct method of band making and band adaptation at the chair on the natural teeth, whether permanent or deciduous. When I began using the direct method, I fitted a new band each time to the individual molars on each side of the mouth, until I discovered that the four first permanent molars were of the same circumference in the same mouth in nearly every case, so that given the circumference of one of the molars, it could be laid out on a piece of band material and duplicated three times; thus all of the four molar bands could be made at once, ready for fitting and contouring to these teeth.

I then began making sets of four molar bands of the same size for one case, but of varying sizes for larger or smaller molars. For example, I found that the circumference of the average first permanent molar at its greatest diameter was 1.40 inches, so that bands made up of this size fitted the average first molar. However, in order to fit the variations, I made up bands in sets of four for maxillary and mandibular molars of: 1.32 inches, 1.34 inches, 1.36 inches, 1.38 inches, 1.40 inches, 1.42 inches, 1.44 inches, 1.46 inches, 1.50 inches, and an occasional 1.55 inches for unusually large molars.

With this variation to select from in stock, a band is chosen which, it is thought, will fit one of the first molars, and slipped over the crown. If too small, it will not slip over, and if too large, it will be loose on the tooth.

The band chosen should fit very tightly and should be forced on with a band setter. The ends of the maxillary molar bands are cut on a slight bias, and those of the mandibular on a little greater bias so as to fit the contour of the maxillary and mandibular molars respectively. These bands can usually be fitted directly to the teeth without separation, without hurting the patient, but separation is recommended when necessary. The band should be festooned mesially and distally slightly, burnished to the molar with the burnishing instrument designed by Dr. Young, removed and recontoured with special contouring pliers, of which there are several patterns, and made thus to fit tightly at the neck of the tooth and on the buccal, lingual, mesial and distal surfaces. The band should not be high enough to occlude with teeth of the opposite jaw, nor should it overlap the occlusal surface of the molar.

The idea of swaging a band which Dr. Waugh uses is certainly a very valuable feature, in that it swages the occlusal edge of the band tightly against the buccal and

lingual surfaces, and the mesial and distal approximating surfaces of the molar in a way that I think no other method can do. The band cannot be swaged in the mouth, but can only be adapted a step at a time with an instrument with flat serrated surfaces and smooth burnishing edges. However, with band material of proper hardness and softness, the band can be snugly and satisfactorily adapted to the tooth surfaces, though not quite as perfectly as if they were swaged. Some have difficulty in removing molar bands from the teeth. To my mind there is only one way of doing this correctly, and that is to remove the band with a removing plier, one pattern of which I invented some years ago, and with which the band can be easily and instantly removed from a molar tooth without the slightest degree of pain or discomfort.

With the direct method I can make two bands for two molar teeth in ten minutes, and take a compound impression of these bands in ten minutes more, after which the impression is removed to the laboratory, and the rest of the work in pouring the cast and in making the appliance is done there.

The complete direct band-making method, an outline only of which I have given, is published in the INTERNATIONAL JOURNAL OF ORTHODONTIA for October, 1921. I trust that I have not taken up too much time from the discussion of the indirect method which Dr. Waugh has so carefully presented, and which is deserving of a very full discussion on its own merits. Dr. Waugh is past master of the fine detail in technic, and when his paper is carefully analyzed it will be found that he has attained the maximum of perfection in results by his attention to the infinitesimal detail.

Dr. Abram Hoffman.—I have enjoyed the remarks of Dr. Waugh and those of the discussers, and wish to say that a carefully made and placed molar band is a very important adjunct in our work. In view of this fact, I wish to add a little testimony.

Two years ago, Dr. Waugh explained his method to me. Up to that time I had been using clamp bands almost exclusively, and had tried some plain pinch bands but without a great deal of success. After this method was explained to me, I undertook the indirect method of making bands, and from that time to this have followed almost exclusively a method similar to that outlined by the essayist. The method explained today is a little different from the one described two years ago, and my technic also varies a little from that given then, as well as from that presented today.

The first variation I will mention is the manner in which I put compound in the copper band. The band is heated, partially filled with almost molten compound, transferred quickly to the tooth, pressed carefully and firmly to place over the tooth and the impression taken. After cooling, it is removed with care.

The next point of difference is the use of artificial stone for the tooth model instead of plaster, amalgam, Melotte's fusible metal or anything of that sort. With artificial stone we get a satisfactory reproduction capable of withstanding considerable misuse in swaging.

I feel indebted to Dr. Waugh for the suggestion of fitting this model of the tooth directly in the compound impression. This plan will prove a time saver for both patient and operator, and will eliminate one sitting.

There is one point in connection with the fit of these bands to which I desire to call attention. We all have seen beautiful illustrations of the fit of bands around the gingival line; we have seen it in the radiograms taken with appliances in place and otherwise. I will not undertake to account for this lack of fit, but I do know that pictures taken with bands made after the indirect method have a much better appearance around the gingival line than most clamp or plain bands.

I have had so much satisfaction in the use of these bands that I want to add another word to this discussion. A great many of the bands have been placed, and but few have been battered down at the occlusal margin; they stay cemented and seem to fit nicely around the gingival portion. It may be desirable in a very few cases to contour them just a little with suitable contouring pliers. The occlusal margin is festooned somewhat after the manner of festooning the gingival margin, and that festooning prevents the battering

down which is so common to us all, and allows a portion to project upward in the grooves of the tooth when it is swaged, so that it makes a claw-like formation. I have never seen one of these bands give way under stress so as to be forced under the gingival tissues as other bands have been known to do, only too often.

Dr. Waugh (closing).—It is gratifying that so much discussion has been brought out, and inasmuch as my paper has thoroughly described the technic which I follow, I shall endeavor not to prolong it. I want to emphasize the point, however, that I have tried through the years every method mentioned in the discussion and have found the one described the most satisfactory in my practice from the standpoint of (a) accuracy, (b) ease for patient and operator and (c) saving of time at the chair of both operator and patient. Dr. Mershon called attention to the fact that bands may be slipped over the bulging portions of tooth crowns more closely by following relatively definite lines in the process of placement. This is, of course, not new and we have always taken advantage of this to reduce the amount of excess circumference of the band at the cervical edge over that of the tooth. In the paper I referred to this point when I said that just prior to final fitting on the tooth, before cementation, we turn this edge inward with curved-beak pliers so that it half scrapes and half springs past the bulge of the crown. We must not deceive ourselves into thinking that it is possible to make a plain band fit closely at the cervix without grinding the lateral walls of the crown to a parallel. This cannot, of course, be done in orthodontia. However, the band, if fitted as just described and allowed to extend not over 2 mm. beyond the normal position of the gum margin, will not cause a considerable irritation. And what interests me most in the discussion is that by the indirect technic described, it is possible to draw in the band at the cervical edge so that it cannot be made to fit any closer no matter what method is followed. I feel, therefore, that the importance placed upon compensating bulgings and depressions of the later walls of the crowns of the molars has been emphasized beyond the practical point.

I desire to thank all of the men who took part in the discussion. I believe there were no questions raised that were not answered in the paper.

In closing, may I call attention quite respectfully, I assure you, to the fact that all of the discussors except two, admitted not having used a similar indirect technic for making anchor bands? Both of those who have used it endorse it, and the one who has followed my technic closely for about two years is enthusiastic concerning its advantages.

I desire to thank the members for the kindly consideration given both my paper and the clinic. If any of you are in the vicinity of my office and care to step in and give time to looking over bands in the mouth, I shall be glad to have you. If you will make suggestions for the improvement of the technic, I wish in advance, to assure you of my lasting gratitude.

DEPARTMENT OF
ORAL SURGERY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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A FURTHER CONSIDERATION OF SOME PHASES OF THE TREATMENT OF CLEFT PALATE CASES*

By Harry E. Kelsey, D.D.S., F.A.C.D., Baltimore, Md.

DEFORMITIES or abnormalities of the human body are important in proportion to their prevalence and to their influence upon the function and the appearance of the victim. There is probably no other abnormality to which the human race is subject which in extreme cases is more unsightly, or which interferes so much with the several functions of the mouth and nose as harelip and cleft palate, and they occur with such frequency as to make their careful study a matter of great importance.

With regard to the prevalence of harelip I quote from Dr. John Staige Davis' book on *Plastic Surgery:* "Harelip is more frequently found in males (73 per cent in my series), than in females. The left side is more frequently implicated (80 per cent in my series). It is said to occur once in about 2400 infants. Turnure quotes Hang's statistics dealing with the relative proportion of the types of harelip: simple unilateral harelip without bone involvement, 25 per cent; simple bilateral harelip without bone involvement, 3 per cent; complicated (bone involvement) unilateral harelip, 49 per cent; complicated bilateral harelip, 23 per cent. The percentages in my own series of cases practically coincide with these figures."

There is no definite knowledge as to the cause of these malformations, but the old theory that it was usually caused by prenatal maternal impressions is no longer accepted, because most of these impressions occur after a period when these structures would all have been formed. Yet it is worth considering that the belief among some races in maternal impressions is so absolute that it might thereby constitute an etiologic factor in cases where the impression was received very early. Most of the peasants of Europe, par-

*Read before the Fourth Annual Meeting of the Southern Society of Orthodontists, Nashville, Tenn., January 21, 22, 1924.

ticularly the Scandinavian races, believe that cases of harelip result from the mother's seeing a hare previous to the birth of her child.

It is believed by many, some of whom have made a deep study of the subject, that heredity is the most important factor, and tabulated data, with family histories insofar as they could be secured, on a large number of cases, presented at a meeting of the Eastern Association of Orthodontists, seemed to indicate clearly that if the history could be carried back two or three generations it invariably showed cases of cleft palate, and that its appearance conformed to the Mendelian law of heredity. Of course, it was not possible except in a few cases to get complete family histories, largely because people regard it as a stigma and resolutely conceal the fact that there have been other cases among ancestors or relatives.

There is a wide variation in cases of harelip and cleft palate, ranging all the way from a simple notch in the lip to complete fissure of the lip on both sides, and extending back through the alveolar ridge, hard and soft palate, with more or less deficiency in the amount of tissue making up the separated portions of the maxilla and lip.

Whether the case is mild or extreme, it would seem that orthodontic treatment at the proper time to bring the bony tissues involved, as well as the soft tissues covering them, into apposition and proper relation with other structures, is a necessity, yet through lack of familiarity of the plastic surgeon with the work of the orthodontist, and to some extent *vice versa,* patients have not generally received adequate or timely orthodontic aid. In cases where they have the great benefit is manifest. Therefore, it seemed worth while in this paper to lay some further stress upon this point.

We as orthodontists should give to the subject a deeper and much more thorough study. It has been my experience that the plastic surgeon welcomes the aid which the orthodontist can give him, and is also anxious for such record models of their cases as we as orthodontists keep of ours. I have been, for some time, getting impressions and making casts of many of the cases of Dr. John Staige Davis, head of plastic surgery in the Johns Hopkins Hospital, and a number of those which have come into my hands to treat I have found could be greatly benefited by further plastic operations which he has very successfully performed. It is an almost self-evident fact, supported however by experience, that plastic operations are successful in restoring normal conditions, in proportion to the character and severity of the case. If it is a very exaggerated case the operator cannot hope for the same measure of success as in the milder type in which there is perhaps only a unilateral harelip with a perfect dental arch to work over when sewing up the fissure. Here is little deficiency or displacement of tissue. Compare with this, double harelip and cleft of alveolar ridge, with a frontal or intermaxillary lobe much protruded, and it becomes evident at once that only a compromise between normal and abnormal conditions can be effected. This compromise may come pretty close to the normal if the full resources of both the plastic surgeon and the orthodontist are brought to bear upon the case from earliest infancy until the occlusion of the teeth is as well established

as possible, and such prosthetic restorations as may be required for missing teeth are temporarily or permanently inserted.

Both Federspiel and Davis speak of the advantage of using adhesive tape to bring the widely separated portions of the lip together and press down the protruding globular process before operating. This is an orthopedic procedure quite analogous to orthodontic treatment, and is evidence of the value of this type of treatment. Federspiel, who is an orthodontist as well as an oral surgeon, has called attention in some of his articles to cases in which he has employed intermittently orthodontic and surgical treatment. It is my belief that in severe cases of cleft palate with harelip the highest degree of success can be attained only by this method, and that while the treatment need not and should not be continuous, the full measure of success will not be obtained until the rapid developmental period is passed, and not even then in some cases which may require periods of treatment up to the time of the eruption of the third molars. It is unreasonable to expect, also, that in severe cases the plastic work can all be done at once, and in referring cases, as I have had occasion to do, which had already had one or more plastic operations for further work, I have invariably told the patient that it might still not be possible to do everything in one operation.

After a plastic operation or during the influence of orthodontic treatment changes are brought about to which Nature accommodates the structures operated on and those adjacent to them, and sometimes a considerable period of rest should be allowed for this accommodation, after which the new operations or orthodontic treatment will progress much more satisfactorily.

Cases which I have seen and treated at the age of nine or ten, or even older, that have had one to nine plastic operations, exhibited distressing results which would have been infinitely better had the patient had orthodontic treatment during the period between plastic operations. Immediate closure of widely separated fissures involving great tension and stretching, frequently slough or tear out, and much of the already meager amount of tissue is lost, making the next operation still more difficult.

If there are teeth in the mouth for attachment of orthodontic appliances, approximation of the structures by orthodontic means will greatly facilitate the plastic operation and often insure its success where it must otherwise fail. I do not wish to be understood as saying that orthodontic treatment must invariably precede plastic operations, but where either can benefit the patient they should alternate in such order as the requirements of the case demand.

Except in cases where mastication is too greatly interfered with individuals suffering from cleft palate seem to be rather more robust as a class than others, if they show any difference, at least such has been my experience, and they consequently usually respond well to orthodontic stimulation.

As before stated, these unfortunate cases have had far less intelligent orthodontic treatment than they deserve, and as a result our technic in treating them is borrowed from the routine cases which occur in orthodontic practice, and which may be as difficult but are less complicated and do not

furnish appliances well adapted to this work. There is great need for the development of special orthodontic appliances for the treatment of cleft palate cases. Much patient experimentation and ingenuity will be required to evolve appliances which can be effective in the highest degree, particularly in the younger patients. It seems not impossible that delicate appliances might be devised for compressing arches in infants previous to the first plastic operation. It would seem that they should be tolerated as readily as lead plates with wires passing through the maxillary bones from side to side and twisted up to close the arch. This method which has been employed in a great many cases will actually bring the lateral halves of the jaw together, but it is manifest to any dentist or orthodontist that it must do great damage to the future denture, for as we all know the jaws in infants are full of tooth germs which will be displaced or killed outright. There has been some evidence collected to show that such has been the case. Therefore, that operation seems justifiable only if no other method of treatment could be used. Both Federspiel and Davis discourage this method, Federspiel showing how it displaces or kills tooth germs, with the usual bad sequelae, and Davis because of sloughing of the tissues.

Without doubt, if cases of cleft palate were more prevalent so that they occurred frequently in the practice of all orthodontists, greater advances would have been made in that part of the treatment which belongs properly to them, and methods might have already been evolved which would make such severe procedure not only unnecessary but unjustifiable.

It is certainly up to the orthodontist to demonstrate that it is just as important to this class of patients as to any other that they have good teeth and as near normal occlusion as possible and normal relation of the jaws, for no matter how successfully the soft tissues are united and put into place, unless much bone development can be secured through orthodontic treatment the results in a large majority of these cases must be far from satisfactory in appearance or efficiency. This is well demonstrated by the fact that all severe cases of cleft palate and harelip present malocclusion of the teeth after all the plastic surgery has been done, and some of them such severe malocclusion of the teeth and malrelation of the jaws that without orthodontic treatment they are hopeless both in appearance and function. The only exception to this is that class of cases in which there is no fissure of the alveolar ridge.

DEPARTMENT OF DENTAL AND ORAL RADIOGRAPHY

Edited By

Clarence O. Simpson, M.D., D.D.S., and Howard R. Raper, D.D.S.

THE TECHNIC OF ORAL RADIOGRAPHY

By Dr. Clarence O. Simpson, St. Louis, Mo.

EXTRAORAL EXAMINATIONS

(*Continued from page* 182.)

Position of Head. Reclined to the limit of flexibility. Sagittal or median plane vertical. Check in contact with cassette or film container. For the condyle, face turned very slightly toward the cassette. For molar regions, tip of nose about half an inch from the cassette. For the canine and premolar regions, nose in contact with cassette. For

Fig. 1.—Position of cone, head, and cassette for an extraoral view of the molar regions.

Fig. 2.—Position of cone, head, and cassette for an extraoral view of the canine and premolar regions.

Fig. 3.—Position of cone, head, and cassette for an extraoral view of the incisor regions.

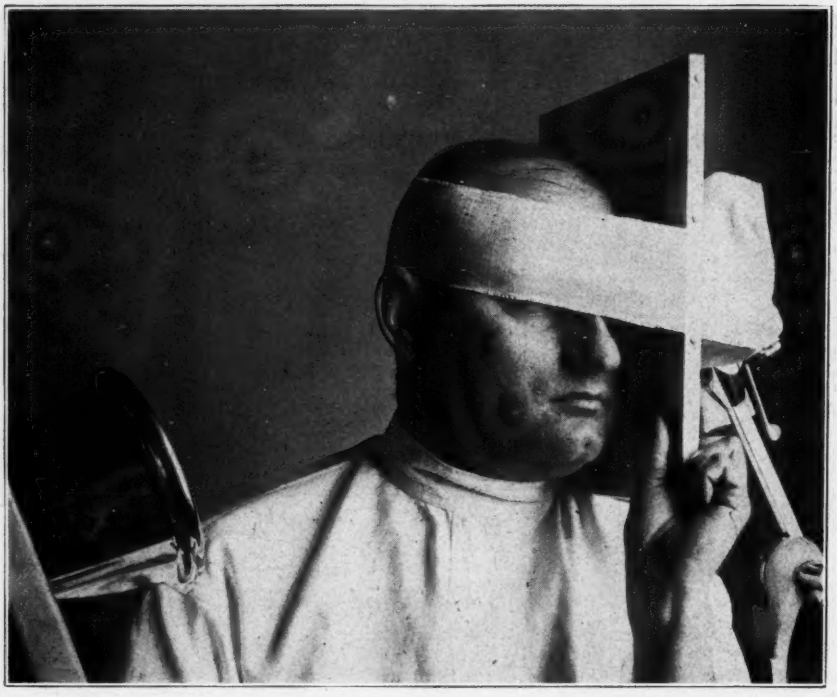

Fig. 4.—Illustrating the use of a bandage to promote immobility during extraoral examinations. The position of the head in this illustration is for a view of the condyle.

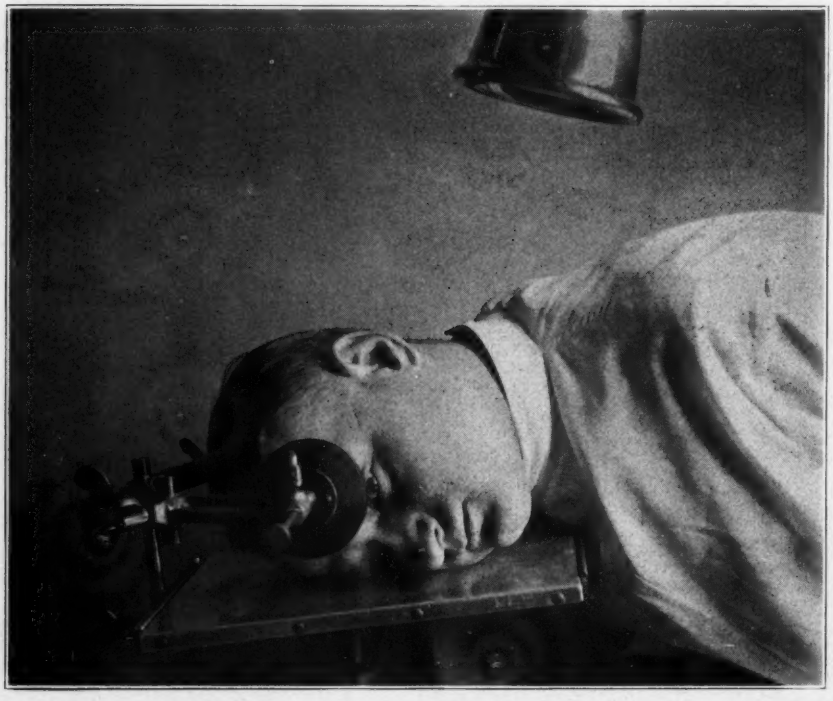

Fig. 5.—Illustrating the use of a stand with head clamps for extraoral examinations.

incisor regions, head inclined backward and laterally to the limit of flexibility, with the nose and chin pressed tightly against the cassette.

Anteroposterior Angle of Projection. Perpendicular to the cassette.

Verticohorizontal Angle of Projection. Twenty degrees below horizontal.

Placement of Cassette. With the arm of the operating chair removed, the patient is directed to turn until the region to be examined is toward the head rest. The cassette is rested against the head rest and inclined ten degrees toward the neck from vertical.

Retention of Cassette. Supported by patient's shoulder and hand for lateral regions, and both hands for incisor regions. Immobility promoted by a tight bandage around patient's head, cassette and head rest.

Cone. Centered at the center of the region to be examined.

Spark Gap. 4½ to 5 inches.

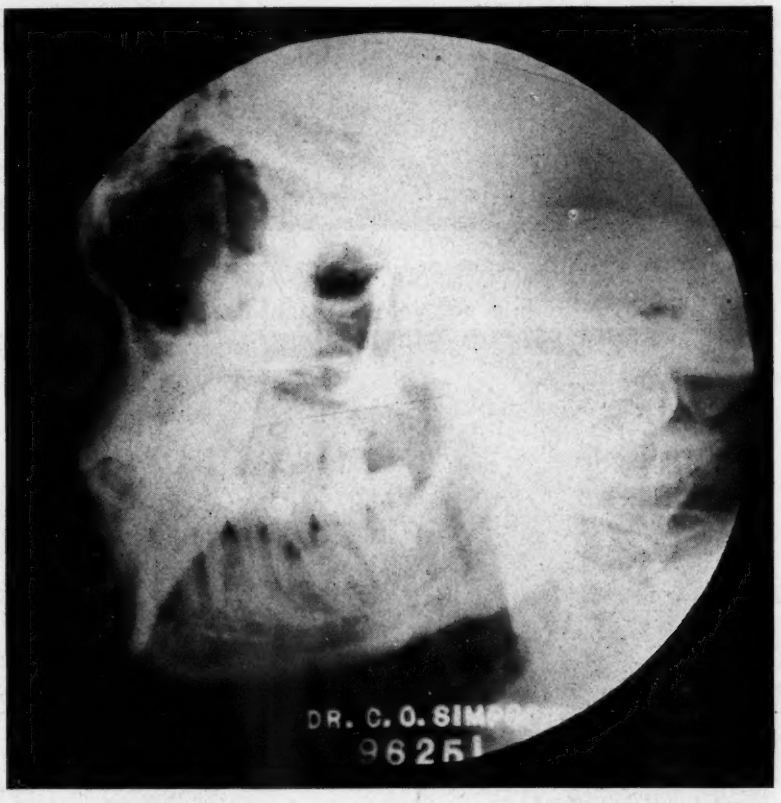

Fig. 6.—An extraoral view of the molar regions. Note how the regions under examination are freed of the avoidable superimposition without distortion of the images.

Exposure. Canine and posterior regions 40 to 60 milliampere seconds at a 30 inch target-film distance with double coated films and intensifying screens, 200 to 250 milliampere seconds without screens. Incisor regions 150 to 200 milliampere seconds with screens, and impracticable at this distance without screens.

Explanatory Description. Extraoral examinations are indicated for hypersensitive patients who cannot retain the intraoral packets in posterior

Fig. 7.—An extraoral view of the canine and premolar regions. This view is limited in extent because of the curve in the dental arches at this location.

Fig. 8.—An extraoral view of the incisor regions. This view is not generally used or appreciated, but is useful in localization and in suspected fracture of the mandible.

regions, for children to eliminate the discomfort and necessity of cooperation in intraoral examinations, where trismus or acute inflammation prevents intraoral examination, and where it is desired to extend the examination to areas not covered by intraoral examinations.

The limitation of extraoral examinations is the impaired definition in the negatives because of the superimposed structures, and the distance of the parts from the film. This restricts the information obtainable to the grosser structures and lesions. The excessive distortion of the images and the avoidable superimposition of structures commonly evident in extraoral views can be obviated by application of the technic here described. By having the anteroposterior angle of projection perpendicular to the film and turning the head for the different regions the distortion is minimized, while the extreme bending of the neck with the teeth in occlusion removes the vertebrae from superimposition on the region being examined. The greater target-film distance than for intraoral examinations is recommended to minimize the distortion of the images, and the effect of unavoidable movement of the patient.

Immobility is essential to the success of extraoral examinations and every available means to secure it should be utilized. Tables or stands with head clamps are most efficient for fixation, but the uncomfortable pose required detracts from the advantages in their use. The tight bandage illustrated and described serves the purpose and dispenses with the additional equipment. Just a few seconds before the exposure is begun, the patient should be requested to hold the breath and cautioned not to move.

Although extraoral examinations may be made with films or plates in containers without intensifying screens, the excellence of modern screens makes it desirable to use the double screen method to shorten the exposure. In calculating the exposure and judging the development of the image the operator should consider that the skull and superimposed portions of the negative must be light or thin to render the proper density to the region under examination.

(*To be continued*)

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

Should the Stomatologist Make His Own Radiographs? Dufougere (Paris). Revue de Stomatologie, January, 1924, xxvi, 1.

It being admitted that the dental radiograph renders immense service to the buccal specialist, including the dentist, the question is pertinent "should he do this work himself or leave it to the roentgenologist?" There is naturally a difference of opinion here. One faction advises that "the shoemaker stick to his last," adding that the stomatologist has neither the skill nor the time to devote to roentgenography. The other side admits that this is good advice if the dentist merely has x-ray work done in the unusual case. It holds, however, that the dentist should always avail himself of the x-ray apparatus, as part of his daily routine, and that under such circumstances it would be asking too much of him to put his work out. He would either need to master the art of roentgenography or have a staff man in his employ for this purpose.

To take up in detail the pros and cons of the argument the author does not believe that the dentist should dabble in roentgenography and it would be necessary for him to have some knowledge of electrophysics. As for equipment, the small and relatively inexpensive machine now available will answer the purpose. The technic of roentgenography is easily mastered. This leaves the problem of interpretation, and here the author would compromise by having the main objective the avoidance of gross error.

Radioscopy is of no use to the stomatologist while radiotherapy requires a special installation and should also be disregarded. As for possible dangers these are almost impossible with the small diagnostic outfit. In regard to waste of the dentist's time, it takes about ten minutes to get a plate, and if after this has been developed it is obscure the process may be repeated. Presumably at first, although the author does not so state, the beginner would have to depend for some interpretation upon the services of an expert, but with experience he could dispense with this assistance.

Chancre of the Gum. Lortet-Jacob (Paris). Revue de Stomatologie, January, 1924, xxvi, 1.

This article appeared in a recent number of the *Progrès Médical* and is therefore not addressed especially to dentists, to whom however it should prove of much interest. Dr. Chompret, well known as stomatologist, had shown a case of this affection to a body of syphilographers, and in the paper and discussion numerous data were brought out. This localization is peculiarly of dental origin although very exceptionally it may come about in some other manner. No doubt the dentist is more apt to be inoculated from this localization; so that if the affection originate in the dentist's chair it is apt to go back to it. The lesion is very easily overlooked, especially on a diseased gum. In a suspicious lesion it is a simple matter to look for the lymph gland enlargement at the angle of the jaw, which is always unilateral. It must be borne in mind that these glandular tumors may suppurate.

Chompret mentioned the case of the mother of a medical colleague who had developed a chancre of the gum from the manipulations of a dentist who was not cleanly in the use of his instruments, the source of the disease being evidently a syphilitic patient who had been treated not long before. Jeanselme, Gougerot and Simon have all seen patients contaminated by dirty dental instruments and in the case of the first named it was extraction forceps which probably conveyed the virus. Chompret and Queyrat have each seen a case of infection of the dentist from syphilitic patients. One dentist had pricked his finger accidentally with the soiled instrument, while the other had used one of the latter to open a pimple. In all of these cases the lesion on the gums was primary and not a mucous patch. The latter does not seem to figure in these gum locations as it does in the tongue, cheek, lips and throat.

Misplaced, Unerupted and Impacted Teeth. A. F. Tyler and W. L. Shearer, (Omaha). The Journal of Radiology, February, 1924, v, 2.

In this x-ray controlled study of the subject the authors have arrived at certain conclusions. Third molars are very commonly found impacted or merely unerupted and in various positions. Next in frequency in this connection are the upper cuspids. In regard to symptoms these are frequently absent, and are called forth only when pressure symptoms appear. The compression may be against a normally placed tooth or a nerve trunk. The pain is dull, hard to locate and suggestive of neuralgia. In all puzzling cases of facial neuralgia a dental radiogram should be obtained. Physical examination may quickly note the absence of a tooth from its normal position. Mere absence in itself signifies little, and the x-ray is necessary to locate the possible impaction or unerupted tooth.

In regard to treatment this may, in the young, be done by orthodontia, but in the adult it must be surgical. There should be block anesthesia with patient recumbent. After the buried tooth has been removed by modern surgical technic the large cavity which may remain ought to be irrigated while closing, for there should be neither temperature nor any interference with primary union.

Necessity of Better Dentistry for Children. C. B. Bray (Birmingham). Archives of Pediatrics, February, 1924, xli, 2.

Dentistry is, or will become, a feature of preventive medicine, provided it can be begun in childhood. At present the propaganda for conservative dentistry in school children is antagonized by the ignorance of the proletariat, and the parents are talked out of it by the neighbors as fast as they are talked into it by educators. Not until they are kept awake by an abscessed tooth do the parents begin to take an active interest in the child's teeth. The author believes that dead and abscessed teeth in childhood are quite preventable.

Another difficulty is found in the belief of dentists that dentistry in childhood is a thankless activity, requiring endless patience and diplomacy. The author has not found it so—rather the reverse in fact; but the majority rush through the work when they cannot evade it and even things up by making no charge. This makes it bad business for the dentist as well as for the child.

Much harm is done by using the term "temporary teeth." It is incorrect in addition to being unwise. Why are they temporary? Not from any inherent vice but because they are forced out by the second dentition. Naturally these teeth have long and well implanted roots but pressure from beneath causes their absorption. These teeth are the cause of focal infection. Caries of the deciduous teeth, tonsillitis and Vincent's angina should be considered together in securing clean mouths. The author cites several cases, in one of which there was apparently multiple arthritis and some endocardial lesion requiring constant sojourn in bed. The entire picture cleared up after extracting some abscessed teeth and removing the tonsils.

Ideas on the Origin of Dental Caries. Rousseau-Decelle (Paris). LeRevue de Stomatologie, December, 1923, xxv, No. 12.

The author sums up his long article as follows: Dental caries is not a morbid entity but comprises two different affections of the teeth, which differ in their etiology, evolution and prognosis. In one case the cause is exterior and the disease affects the hard tissues with a secondary reaction in the odontoblasts. In this affection the prognosis is good with timely treatment. In other cases the origin is internal, primarily a trophic trouble of the odontoblast, and the dentine and enamel are only secondarily involved. The prognosis is bad. Disorders of nutrition have an important influence on the evolution of caries. They are responsible for the second form and play an aggravating rôle in the first or external type. Our studies of the etiology and pathologic anatomy of caries must be begun anew, and for their success they must be made along the lines just laid down, regarding caries as a twofold affection and not as an entity.

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EDITORIALS

The Ethics of Advertising

ONE of the most important factors in business today is advertising. The power of the printed page in the sale of an article can very easily be demonstrated by the examination of any magazine or paper. Advertising has assumed such an important rôle in business that a commercial house attempting to launch the sale of any article, regardless of how good it may be, always takes into consideration the conducting of an advertising campaign. Any firm which has materials or supplies to sell to dentists has long ago recognized the value of advertising.

There is probably no profession which has been more greatly influenced by advertisements than the dental profession. This fact is proved by the

publication of several dental journals which are issued solely for the purpose of getting advertisements to the practitioners. These journals are published by certain commercial houses, and are not sold by subscription but are sent to the dentists gratuitously. If the dental profession was not a good subject for the dental advertisers, these magazines would necessarily go out of business. However, as a matter of fact, the dental publications which receive the greatest incomes today are those which are run primarily in the interest of the advertisers.

There are certain journals which will accept any type of advertisement, regardless of how ethical or true it may be, provided the individual is able to pay for the space at the rate charged by the publisher. This is proved by the fact that recently a very misleading advertisement appeared in several dental publications, the copy so misleading that it attracted our attention. Knowing the publisher of one of the magazines personally, we wrote to him calling his attention to this particular advertisement. The publisher of the magazine answered our letter, but in no mistakable terms informed us that he was capable of conducting his own magazine, and that he had read the advertisement referred to and in no way could he see that it was misleading. In the other case we received no reply whatsoever from the publisher, so wrote to the editor of the magazine and received the information that he had resigned, owing to the fact that the advertising policy of the publishers could in no way be made to fit with his understanding of ethics and the duties of a magazine to the profession. These two magazines are the type published solely in the interest of the advertiser and do not charge any subscription rate. It is not surprising that such magazines should follow the policy of "the public be damned" as long as the advertisers are willing to pay the freight.

However, some journals which are published in the interests of the dental profession and are classed as scientific magazines, and feature articles which have for their object the uplift and education of the profession, do not always conduct the advertising pages in accordance with the ethics and the scientific department of the magazine. We recognize that the dental journal must necessarily be controlled by at least two departments; that is, the group which controls the scientific articles, and the department which secures the advertisements and signs the contracts with the individuals who are willing to purchase space in the journal. Immediately there is apt to be more or less conflict between these two groups of men because the editors of the scientific pages are inclined to be governed by a sense of duty and justice to the profession based upon ethics as interpreted by the dental and medical profession. The advertising manager, on the other hand, is influenced by the amount of space he sells to men desirous of advertising their goods in the journal, and consequently very often overlooks the ethics as understood by the medical and dental profession.

It is our belief, however, that any journal which will accept advertising copy containing a misleading statement is doing an injustice to its readers, and cannot retain the respect of the dental profession. From information

obtained from various sources, we are compelled to state that in some instances the dental magazines which are published for scientific purposes cannot always exercise the proper influence over the matter that appears in the advertising pages. Some time ago an advertisement appeared in the Journal of the American Dental Association presenting an article in such a manner that it was objectionable to a large number of men in the profession. The attention of the editor was called to this, and as soon as the contract for the advertisement expired the editor tried to prevent the renewal. The manufacturer of the article took it up with the other members of the editorial board, the editor was overruled and the article was again advertised in the *American Dental Journal.* Instead of the advertising copy showing an improvement, it continued equally as bad if not worse. This advertisement was so objectionable that the matter was taken up by a society with the editor of the journal, calling his attention again to the misleading statements made in the advertising pages. The editor raised the question that they cannot deny advertising space to this individual because of the liability of a damage suit. This question of the possibility of a journal being sued because it refuses to accept advertisements contrary to its principles is one that has no standing in the courts of justice. The publisher of a magazine has the right to refuse to sell advertising space to whomever he pleases, and a manufacturer cannot force a publisher to sell him space contrary to the wish of the publisher of the magazine. Not only has the publisher the right to refuse space to any one whose business methods he does not approve, but he has the further right so to word his contract that even if he sells space he can reserve the right to reject the copy which is supplied for publication if that copy does not meet with the approval and policy of the magazine. These statements are made because some of the leading dental journals have pretended that they cannot control their advertising pages owing to the possibility of a damage suit. In other words, they are using this phase as a subterfuge or they are unfamiliar with the principles of advertising as is practiced by some of the dental, medical magazines and also popular magazines that have a large circulation among the public.

It recently became our good fortune to sit in a committee that was investigating a product widely advertised to the public in popular magazines and newspapers. The manufacturers are making statements which are very misleading. A certain dental society had passed resolutions condemning this article as being injurious to the teeth, and was about to have these resolutions published, when the attorney for the advertiser wrote to the chairman of the committee saying, that if such resolutions were spread broadcast the manufacturer of the article would have to take steps to protect his interest. This was simply an attempt or threat to bring suit against the individual men or members of the society if these resolutions were published. Very shortly thereafter the chairman of the committee of the dental society received a communication from the chairman of the ethics committee of one of the largest advertising clubs in America informing him that if the committee of the dental society would present evidence to the ethics committee that

these advertisements were misleading and the product was injurious to the teeth, the ethics committee of the advertising club would take such steps as would bar the manufacturer of the article from advertising in many papers or magazines. If advertising clubs take such a positive stand in relation to proper advertising, dental journals should do no less.

Therefore, the dental profession has a right to expect the advertisements which appear in the pages of the journals to possess as high a standard of ethics as is found in the scientific pages. Any dental journal which is unwilling to censor its advertisements or assume some responsibility over what is published in the advertising pages is not performing its full duty to the profession; and any publisher who attempts to state that he cannot control his advertising pages is also shirking responsibility. We believe the time has arrived for the censure of dental advertisements, and we hope some action will be taken by the House of Delegates of the American Dental Association to set a standard in ethical advertising.

ORTHODONTIC NEWS AND NOTES

Sidelights on the Meeting of the American Society of Orthodontists, Held at the Hotel Muehlebach, Kansas City, Missouri, March 18-21, 1924

THE curtains have only recently been drawn over what has seemed to many to be not only one of the most significant, but also one of the most interesting and scientific meetings which this organization has held in its entire history.

Probably the most outstanding paper of the meeting was that of Dr. Paul Simon of Berlin, Germany, on the subject "Gnathostatic Diagnosis in Orthodontics." This paper, approaching the entire question of classification and diagnosis of malocclusion from a scientific angle, not only attracted a great deal of attention, but also prompted a tremendous amount of discussion and was considered of sufficient consequence and importance that the New York Society of Orthodontists has called a special meeting in order that Dr. Simon's work may be given them within the near future and preceding his return to Europe.

The clinics, to which an entire half day was devoted, were most interesting and educational. The various modifications of lingual arches and lingual arch technic were significant from the standpoint of appliances.

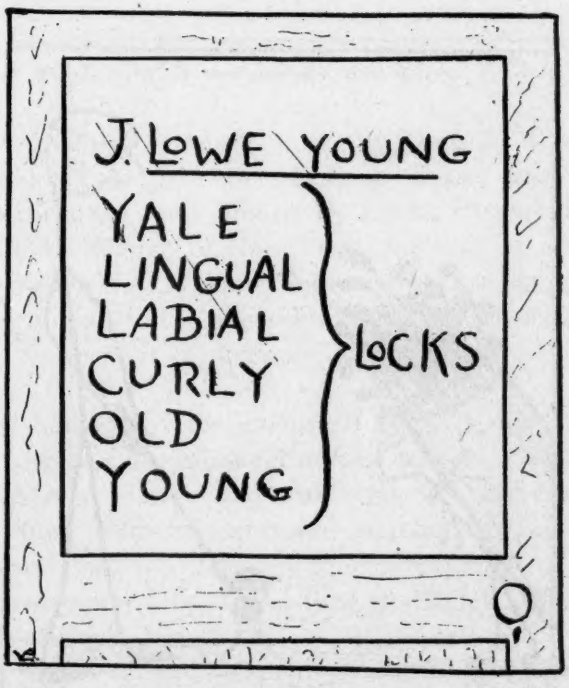
The afternoon of the third day which was set aside entirely for recreational purposes, was devoted to golf at the Hill Crest Country Club. As the grounds were wet and unsuitable for play, indoor golf was planned and the course set up in the main lounge of the Club.

The following were the prize winners of the golf tournament:

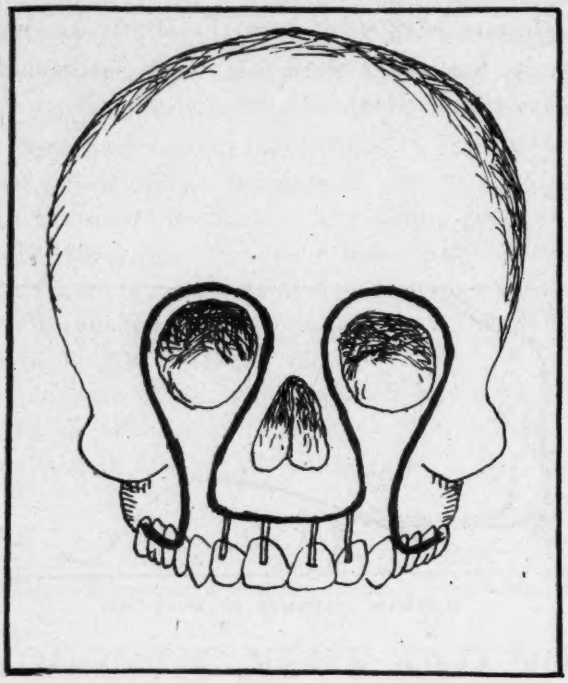
Harry Hosmer of Detroit won the Brady Loving Cup.

Clayton A. Sayers of Syracuse, N. Y., runner-up, the International Cup.

Ketcham preparing to ketch 'em



The Locksmith

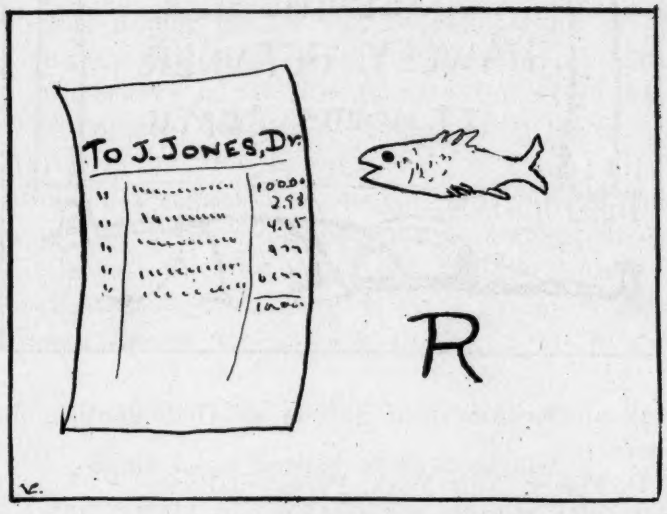


Lourie's extra-high labial arch

Casto getting busy

Other prize winners, in the order named, were:

E. B. Arnold, Houston, Texas.
Wm. C. Fisher, New York City.
F. C. Rodgers, Saint Louis.
Archie B. Brusse, Denver.
Harry C. Metz, Pittsburgh.
Ernest N. Bach, Toledo.
Wm. A. Hillis, Greenwich, Conn.
H. B. Robinson, Great Bend, Kans.



Puzzle: What well-known orthodontist is this?

The largest individual score was made by Louis S. Winston, of Houston, Texas, who carried off the prize for his skill. Prizes were also given to M. N. Federspiel, Milwaukee, and James D. Locke, Grand Rapids, Mich., as well as to Leuman M. Waugh of New York, for skill as entertainers.

Immediately following the Golf Tournament a most enjoyable banquet was held in the evening. In the absence of Dr. C. C. Howard of Atlanta, who was called away on account of sickness, Dr. Joseph D. Eby acted as toastmaster.

The principal address of the evening was made by Richard L. Sutton, M.D., L.L.D., of Kansas City, Missouri on the subject, "With Rifle and Camera in Brightest Africa," illustrated with maps and lantern slides. Dr. Sutton recently returned from an extensive hunting expedition for big game in Africa, and was most interesting and entertaining. His most excellent lecture will be remembered by the American Society of Orthodontists for many years in the future.

Introduction of prominent members of the Society, whose pictures appeared in caricature on the menu card of the banquet, was made by Dr. Leuman M. Waugh of New York.

Presentation of the golf trophies was made by Dr. H. C. Pollock of Saint Louis.

The interesting caricatures of the orthodontists which appeared in the menu are published herewith.

The orthodontists of Kansas City did themselves proud in their entertainment of the visiting guests, and comment was heard on every hand in appreciation of the courtesy and attention that was given to all.

The officers of the American Society of Orthodontists elected for the ensuing year were:

Dr. Wm. C. Fisher, New York, President-Elect.

Dr. Walter Ellis, Buffalo, Secretary-Treasurer.

Dr. Oren A. Oliver, Nashville, member of Board of Censors.

Sixty-Sixth Annual Meeting, American Dental Association, Dallas, Texas, November 10 to 14

Clinic Details

Clinics to be given at the meeting of the American Dental Association in Dallas, November 10-14, 1924, will consist of five types.

1. State Clinics, 2. Section Clinics, 3. Group or Study Club Clinics, 4. New South Clinics and 5. Junior Clinics.

The State individual clinic group will be placed upon a representative basis by requesting each State Society to furnish clinicians for this group to the number of one to the allotted number of delegates.

No one will be permitted to clinic in this group without the recommendation of the President of his respective State Society.

All States will be invited to present clinics in this group except the states hereinafter mentioned as the New South.

All State Clinics will be given Thursday afternoon, November 13th.

Section Clinics will be taken care of by the chairmen of the seven dif-

ferent sections and each one will be requested to furnish three clinics from his respective section.

No one will be allowed to present a clinic in this group without the endorsement of his respective section chairman.

Group or Study Club Clinics will be secured by inviting each State Society to furnish not to exceed three groups of not over ten clinicians in any group.

These groups will consist of a number of clinicians who will demonstrate their subjects in successive steps and no group will be allowed to present a clinic without the endorsement of the president of the respective State Society.

New South and Junior Clinics will be handled by our host and the committee in charge is now active in securing the proper material.

The States represented in the New South Clinic are Texas, So. California, Arizona, New Mexico, Oklahoma, Mississippi, Arkansas and Louisiana (eight states).

The Junior Clinic will consist of a number of 1920-21-22 and 1923 graduates who will give clinics on various subjects, and Texas has promised us a pleasant surprise in both the New South and Junior Clinics.

All clinics except State Clinics will be given Friday morning, November 14th.—*H. B. Pinney, General Chairman of Clinics.*

Saint Louis Society of Orthodontics

The Saint Louis Society of Orthodontics, composed of specialists practicing orthodontia in the city and county of Saint Louis, has recently been organized, for the purpose of the advancement of orthodontics as a science, meetings to be held as called by the President.

After the adoption of By-Laws and Constitution, and subsequent to the preliminary organization, the following officers were elected:

Dr. O. H. Brandhorst, President.

Dr. U. C. Ruckstuhl, Secretary-Treasurer.

Dr. H. C. Pollock, Executive Committeeman.

The Canadian Dental Association

The Canadian Dental Association will hold its twelfth biennial meeting in Vancouver, B. C., August 4-7, 1924.—Sidney W. Bradley, President, 206 Laurier Ave., W., Ottawa, Canada. W. J. Bruce, Chairman of Executive Committee, Birk's Bldg., Vancouver, B. C.

The European Odontological Society

The next annual meeting of this society will be held August 9th and 11th, 1924, at Hotel de l'Europe, Amsterdam, Holland. J. T. Quintero, Presi-

dent, 1 Quai Jules Courmont, Lyon, France. A. C. Lockett, Chairman of the Executive Committee, 117 Park Street, London, W.1.

The American Society of Orthodontists

The Twenty-fourth Annual Meeting of the American Society of Orthodontists will be held in the new Atlanta-Biltmore Hotel, at Atlanta, Ga., April 14, 15, 16 and 17, 1925. (Mark off the date now.)

Walter H. Ellis, Sec'y-Treas.,
397 Delaware Avenue,
Buffalo, N. Y.

Clinton C. Howard, President,
Doctors Building,
Atlanta, Ga.

News and Notes

Dr. C. M. McCauley and Dr. B. L. Reese announce the opening of offices at 304 Chapman Bldg., and 722 Westlake Professional Bldg., at Westlake Park, Los Angeles, Calif., for the exclusive practice of orthodontia.

Dr. Thomas R. Sweet announces the removal of his office to 242 Moss Ave., between Broadway and Piedmont Ave., Oakland, Calif.

Dr. Claude R. Wood announces the opening of offices at 426-30 Medical Building, Knoxville, Tenn., for the exclusive practice of orthodontia.

Dr. Horace L. Howe, Assistant Professor of Clinical Orthodontia, Harvard University Dental School, announces that after April 1, 1924, his practice will be limited to orthodontia, 196 Marlborough St., corner of Exeter St., Boston, Mass.

Dr. L. H. Tate announces the removal of his office to the First National Bank Bldg., Canton, Ohio, for the exclusive practice of orthodontia.